



Jordan University of Science and Technology  
Faculty of Engineering  
Chemical Engineering Department

**ChE 203: Fundamentals of Chemical Engineering**

4 credit hour, 3 contact hour lecture, 2 contact hours practical, 4 credit hour Engineering

**Instructor**

Instructor: Prof. Fahmi Abu Al-Rub

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**Textbooks & References**

**A. Textbook**

	<b>Textbook 1</b>
<b>Title</b>	Elementary Principles of Chemical Processes
<b>Author(s)</b>	Felder, R.M., and Rousseau, R.W.
<b>Publisher</b>	John Wiley
<b>Year</b>	2018
<b>Edition</b>	4th edition

**B. References**

1. David M. Himmelblau & James B. R. (2003). Basic Principles and Calculations in Chemical Engineering. 7<sup>th</sup> edition. Pearson Education.

**Specific Course Information**

**A. Course Catalog:**

Block diagrams for chemical processes. Material and energy balances for steady and unsteady state processes with and without chemical reactions. Phase equilibria.

**B. Prerequisites or co-requisites**

CHE 102 – Introduction to Chemical Engineering

CS 115 – Programming in C++ Chemistry 101

**C. Required/Elective or Selected Elective**

**Required**

**Objectives and Outcomes\***

O1: Apply material balances (e.g., overall, component, atomic) on nonreactive and reactive single-unit and multiple-unit processes and multiphase systems.

O2: Carry out PVT calculations for gas using different equations of state.

O3: Formulate and apply energy balances.

O4: Apply energy balances on nonreactive single-unit and multiple-unit processes and multiphase systems.

O5: Apply energy balances on reactive single-unit and multiple-unit processes and multiphase systems.

\* Number in brackets refer to the Program outcomes

CLO1: Explain the meaning of batch; semibatch; continuous; transient; steady state processes; limiting and excess reactants; degrees of freedom; fractional conversion; yield and selectivity; purge and recycle streams; theoretical and excess air; and dry-basis composition (1).

CLO2: Draw and fully label a flowchart for a given process description (1,3).

CLO3: Perform the degree-of-freedom analysis (1).

CLO4: Write material and energy balance equations for nonreactive systems (1,3).

CLO5: Solve material and energy balance equations of nonreactive systems (1).

CLO6: Calculate fractional excess; fractional conversion; and extent of reaction for a given reaction (1).

CLO7: Write the equations of the three balance methods used in reactive systems (1).

CLO8: Write material and energy balance equations for systems involving reactions (1)

CLO9: Write material balance equation for reversible and combustion reactions (1).

CLO10: Solve balance equations of reactive systems (1,3).

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### Contribution of Course to Meeting the Professional Component

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#### Relationship to Student Outcomes (%)

1	2	3	4	5	6	7
80		20				

#### Relationship to Chemical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
√	-	√	-	-	-

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### Topics Covered

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Week	Topics	Chapters in Text
1-5	Fundamentals of Material Balances	Chapter 4
6-7	Single-Phase Systems	Chapter 5
8-9	Energy and Energy Balances	Chapter 7
10-12	Energy Balances on Nonreactive Systems	Chapter 8
13-15	Energy Balances on Reactive Systems	Chapter 9

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### Evaluation

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Assessment Tool	Expected Due Date	Weight
HW, Quizzes, class activities, etc.		50%
Final Exam	According to the University final examination schedule	50 %