MUTAH UNIVERSITY
Faculty of Engineering
Department of Chemical Engineering

Analysis, Modeling and Simulation of Chemical Processes

COURSE SYLLABUS

Course Code	Course Name	Credits	Contact Hours
0404404	**Analysis, Modeling and Simulation of Chemical Processes**	**3**	**To be determined later**

INSTRUCTOR/COORDINATOR	
Name	**Dr. Salah Aljbour**
Email	saljbour@mutah.edu.jo
Website	

TEXTBOOK
Luyben W.L., Process Modeling, Simulation, and Control for Chemical Engineering, McGraw-Hill (1998).
Other Supplemental Materials
• George Stephanopoulos, Chemical Process Control: An Introduction to Theory and Practice 1st Edition

SPECIFIC COURSE INFORMATION
A. Brief Description of the Content of the Course (Catalog Description)
The course aims to broaden the student's perceptions to model, analyze and simulate chemical processes. The course includes an introduction to mathematical modeling, methods of generating mathematical models, types of mathematical models, mathematical modeling of a number of processes in chemical engineering such as: reactors, distillation towers, and extraction units, absorption towers. Solving mathematical models and computer simulations.
B. Pre-requisites (P) or Co-requisites (C)
(P): 0404305 + 0404437
C. Course Type (Required or Elective)
Required (Compulsory department course)

SPECIFIC GOALS

A. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

1. classify models into: linear, nonlinear, lumped, distributed and dynamic versus steady state models (**SLO 1**).
2. formulate, analyze and understand process models in chemical engineering with examples from reaction engineering, heat transfer and mass transfer operations (**SLO 1**).
3- solve linear and nonlinear system of algebraic equations as well as systems of ordinary differential equations (**SLOs 1 and 7**).
4. simulate process models for design and optimization (**SLOs 1 and 2 and 7**).

B. Student Outcomes Addressed by the Course

1	2	3	4	5	6	7				
✓	✓					✓				

BRIEF LIST OF TOPICS TO BE COVERED

List of Topics	No. of Weeks	Contact Hours
• **Introduction to Modeling** Use and scope of mathematical modeling, Principles of model formulation, Role and importance of steady-state and dynamic simulation, Classification of models, Model building, Modeling difficulties, Degree-of-freedom analysis, Selection of design variables.	1	3 hrs/week
• **Fundamentals of process modeling** Continuity, energy, momentum, and mass. Transport properties. Equilibrium and chemical kinetics and Review of other relevant thermodynamic concepts.	5	3 hrs/week
• **Modeling of Specific Systems** Modeling analysis and simulation of CSTRs under isothermal and non-isothermal conditions, Stability analysis, Non-isothermal PFR, Batch and semi-batch reactors, Heat conduction in a bar, Laminar flow of Newtonian liquid in a pipe, Multi-component flash drum, Absorption column, Ideal binary distillation column and multi-component distillation column.	7	3 hrs/week
• **Dynamics of chemical Processes** First order processes, Second order processes	3	3 hrs/week
• **Simulation** Simulation of the model**,** Introduction and use of process simulation software	In accompany with the other topics.	
Total	16	48 hrs

METHODS OF ASSESSMENT

No.	Method of assessment	Week and Date	%
1	First Exam	6th week	**20**
2	Second Exam	12th week	**20**
3	Homeworks	Homework/week	**10**
4	Final Exam	End of Semester	**50**
Total			**100**