COURSE SYLLABUS – ChE 321

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDITS*				
			Th.	*Pr.*	*Tr.*	*Tu.*	*Total*
Chemical Reaction Engineering	ChE 321	هـ كم ٣٢١	3	--	--	1	3

Pre-requisites:	ChE 302 and EE 332	
Course Role in Curriculum	*Required or Elective:*	Required
	A pre-requisite for:	ChE441, ChE442, ChE451, ChE499

Catalogue Description:
The course aims to develop the student's ability to understand mole balances, conversion and reactor sizing, rate laws and stoichiometry for a single and multiple reactors and its applications to steady-state isothermal reactors. Collection and analysis of rate data of catalytic reactors.

***Textbooks*:**
H. Scott Fogler, Elements of Chemical Reaction Engineering, 4th Edition, Printice Hall Intl., 2006.
**The latest available edition for the world reputable book for Chem. Eng. Plant Design*
***Supplemental Materials*:**
J. M. Smith, "Chemical Engineering Kinetics, 3rd Edition, McGraw- Hill International Book Company, Singapore. 1981.

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:

1.	**Apply** the mole balance equations for batch, CSTR, PFR, and PBR reactors
2.	**Apply** the Levenspiel plots to the sizing of chemical reactors
3.	**Design** Ideal reactors for single reactions in terms of $-r_A$ as a function ofconversion
4.	**Set up** stoichiometric tables as a tool for expressing concentration as a function of conversion
5.	**Apply** the algorithm that allows the solution of chemical reaction engineering problems for isotherms single reactions
6.	**Analyze** rate data using different numerical techniques and softwares such as Polymath software
7.	**Select** the type of reactor and operating parameters to maximize the selectivity and yield of a desired product
8.	**Apply** the algorithm that allows the solution of chemical reaction engineering problems for isotherms multiple reactions Polymath software
9.	**Develop** the rate equation of a catalytic reaction using Langmuir-Hinshelwood mechanism.
10.	**Recognize** safety aspects of chemical reactors.

Topics to be Covered:		***Duration in Weeks***
1.	The Mole Balance and Reactor Sizing	1
2.	Conversion and Reactor sizing	3
3.	Rate Laws and Stoichiometry	2
4.	Isothermal Reactor Design	2
5.	Collection and Analysis of Rate Data	2
6.	Reaction Yield and Selectivity	1
7.	Isothermal Multiple Reactions	1
8.	Catalyzed Reaction	1
9.	Reactor Safety issues	1

Key Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	**an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability**	√
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	**a knowledge of contemporary issues**	√
(k)	**an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.**	√

Key Student Outcomes assessed in the course: (c), (j) and (k)

Class Schedule:

- Lecture: two 1.5 hour sessions per week
- Tutorials: one 3.0 hours session per week

Instructor:	Prof. Yahia Alhamed
Last updated :	January 2015