

**DEPARTMENT OF INDUSTRIAL ENGINEERING  
COURSE SYLLABUS**

<i>COURSE TITLE</i>	<i>ENGLISH CODE/NO</i>	<i>ARABIC CODE/NO.</i>	<i>CREDITS</i>			
			<i>Th.</i>	<i>Pr.</i>	<i>Tr.</i>	<i>Total</i>
<b>Industrial Stochastic Systems</b>	<b>IE 434</b>	هـ ص ٤٣٤	3	1	-	3
<i>Pre-requisites:</i>	IE 332					
<i>Course Role in Curriculum</i>	<i>Required or Elective:</i>		Elective			
<i>Catalogue Description:</i> Deterministic and stochastic processes. Poisson process and related distributions. Birth and death processes. Markov processes with continuous state space. Renewal process and theory. Markovian decision processes in industry. Markovian and non-Markovian systems. Stochastic models for transportation and maintenance systems. Introduction to simulation modeling of stochastic systems.						

**Textbooks:**

A FIRST COURSE IN STOCHASTIC MODELS, Tijms, H.C, (2003), Wiley New York

**References:**

- **FUNDAMENTALS OF QUEUING THEORY**, Donald Gross, Carl M. Harris; 3<sup>rd</sup> Edition, (1998), John Wiley and Sons, New York.
- **STOCHASTIC MODELS – AN ALGORITHMIC APPROACH**, Tijms, H.C, (1994), Wiley New York.
- **AN INTRODUCTION TO STOCHASTIC PROCESSES**, Barlette, M.S, (1978), Cambridge University Press, London.
- **STOCHASTIC PROCESSES IN ENGINEERING SYSTEMS**, E.Wong and B.Hajek, (1985), Springer Verlag, New York

**Supplemental Materials:**

**Course Learning Outcomes:**

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

1. Realize and identify the fact that most of the natural processes are stochastic in nature.
2. Apply engineering sciences and theory related to processes of stochastic nature.
3. Identify, formulate, analyze and solve engineering problems.
4. To provide professional expertise in solving problems in industrial systems of society.
5. To provide expertise in using appropriate modern techniques, skills and engineering tools, in classroom, laboratories, and other educational settings.
6. Function effectively in multidisciplinary teams, in a wide range of organizations.
7. Communicate effectively in written and oral media.

8. To provide students with the necessary education to understand the impact of engineering solutions in local and global societal contexts.		
<b><u>Topics to be Covered:</u></b>		<b><u>Duration in Weeks</u></b>
1	Stochastic and deterministic processes, Poisson process and related distributions, birth and death processes	1
2	Markov processes with discrete state space, definition and examples of Markov chains	1
3	Transition probabilities, statistical inference on Markov chains	1
4	Markov processes with continuous state space, Renewal process and theory	1
5	Time series models, statistical analysis of time series	1.5
6	Markovian decision processes in industry and service sectors	1.5
7	Modeling and design and queuing systems, steady state and transient behavior in queuing systems, Non-Markovian queuing systems	1.5
8	Probabilistic inventory models, single period and multi-period inventory models, perishable inventory system modeling	1.5
9	Stochastic modeling of transportation systems	2
10	Simulation modeling of stochastic systems	2
<b><u>Student Outcomes addressed by the course:</u></b> (Put a $\checkmark$ sign)		
(a)	an ability to apply knowledge of mathematics, science, and engineering	$\checkmark$
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	$\checkmark$
(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	$\checkmark$
(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:** ( ) and ( )

***Instructor or course coordinator:*** Dr. Raed Reda Obaid

***Last updated:*** Jan. 2015