DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Reliability Engineering	**IE 433**	هـ ص ٤٣٣	3	1	-	3
Pre-requisites:	IE 332					
Course Role in Curriculum	*Required or Elective:*		Elective			

Catalogue Description:
Introduction to reliability analysis. Reliability measures: reliability function, expected life, hazard function of important distribution functions. Hazard models and product life. Extreme value distribution. Static reliability models. Dynamic reliability models. System effectiveness measures. Reliability allocation and optimization. Introduction to fault tree analysis and human reliability.

***Textbooks*:**

- **RELIABILITY IN ENGINEERING DESIGN**,K.C. Kapur and, L. R. Lamberson 1977, John Wiley & Sons, Inc., ISBN 0-471-51191-9.
- **INTRODUCTION TO RELIABILITY IN DESIGN**,Charles O. Smith and E.Robert, 1983, Krieger Publishing Company, Inc., Malabar, Florida, ISBN 0-89874-553-5

***References*:**

أسس الهندسة الصناعية،عبدالرزاق ع. أبو النور ، محمد الصادق ع. الجفري ، مصطفى م. الباسوسي، علي م.رشدي ،مركز النشر العلمي ، جامعة الملك عبد العزيز ، جدة ، ١٤٢٠هـ - ١٩٩٩م.

***Supplemental Materials*:**

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

1. Explain fundamentals of reliability analysis.
2. Model and analyze reliability problems.
3. Study static reliability models and solve various static reliability problems.
4. Study dynamic reliability models and solve various dynamic reliability problems.
5. Study and analyze extreme value problems in relation to reliability systems.
6. Apply system effectiveness measures.
7. Explain reliability optimization and fault tree analysis.
8. Effectively use computer packages to solve reliability problems.
9. Search the internet for being updated with recent developments in reliability studies.

	Topics to be Covered:	***Duration in Weeks***
1	Introduction to reliability and Reliability Measures: Reliability Function, the expected life, the failure rate and hazard function, Reliability and hazard function for well-known distribution functions.	2
2	Hazard models and product life: constant, linearly increasing, bathtub, power function and exponential model, Estimating the hazard function, Distribution selection: exponential, Weibull, and geometric distributions, the extreme value distribution and applications.	3
3	Static Reliability Models: Series systems, parallel systems, combinations, complex system analysis, Reliability considerations in design,	2
4	Dynamic Reliability Models: The series system, series chain, parallel system, parallel redundant systems, and standby redundant systems. Perfect switching and imperfect switching. Shared load parallel models.	2
5	System Effectiveness Measures: Maintainability, operational readiness, availability, intrinsic availability.	1
6	Introduction to life testing. Reliability allocation and optimization algorithms and approaches.	2
7	Introduction to fault Tree Analysis and its engineering applications.	2

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: ( ) and ( )

Instructor or course coordinator: Dr. Ibrahim Abdulaziz Al-Darrab
Last updated: Jan. 2014