

**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>
HUMAN FACTORS ENGINEERING	IE 342	٣٤٢ هـ ص	3	2	-	3
<i>Pre-requisites:</i>	IE341					
<i>Course Role in Curriculum</i>	<i>Required or Elective:</i>		Required Core Course			
<i>Catalogue Description:</i> Introduction to human factors engineering. Muscular work. Nervous control. Work efficiency. Body size and anthropometrics. Work station design. Heavy work. Handling loads. Man-machine systems. Mental activity. Fatigue. Stress and boredom. Vision and lighting. Noise and vibration.						
<i>Textbooks:</i> Bush, P. M. (2012). <i>Ergonomics Foundational Principles, Applications, and Technologies</i> . Taylor and Francis (CRC Press), US.						
<i>Reference Materials:</i> 1. Kromer, K.H. (2008). <i>Fitting the human: Introduction to Ergonomics</i> . 6 th ed. Taylor and Francis (CRC Press), US. 2. Wickens, K.H., Yili Liu, J. D. and Becker, S. E. (2004). <i>An Introduction to Human Factors Engineering</i> . 2 nd ed. Pearson Educational, Inc, US.						
<i>Supplemental Materials:</i> Class notes/handouts materials provided by the instructor.						
<i>Course Learning Outcomes:</i> <i>By the completion of the course the student should be able to:</i> 1. Demonstrate an understanding of the fundamental concepts of ergonomics and human factors principles and theory. 2. Explain measurement techniques related to anthropometric and muscular characteristics of human body and human mind, Human mental and physical works, Workload and stresses 3. Apply ergonomic principles in the workplace or other environment. 4. Attain a grasp of the fundamental principles of experimental design, collection of data related to human factors, and their analysis and interpretation (laboratory experiments); and 5. Work in a team and communicate effectively through written reports and presentations. (Course project work, assignments and laboratory reports).						
<i>Topics to be Covered:</i>						<u>Duration in Weeks</u>
1	Foundational Ergonomics: Introduction & background, Ergonomics defined, Ergonomics & safety, Ergonomics domains, Classification of ergonomics problems and History of the field and objectives.					1.5
2	Senses of the Human Body: Introduction and background, Sensory Functions: vision, visual fatigue, Audition, How do we hear?, Environmental Factors in Ergonomics: Visual factors light levels, illumination, noise levels, measuring noise levels. Thermal conditions: temperature & humidity, controlling the thermal conditions. Vibration & the Human Body					2
3	Engineering Anthropometry and Workspace Design (Body Size): Introduction, human variability, statistical analysis, anthropometric data, structural and functional data, use anthropometric data in design, general principles for workspace design.					1.5
4	Workplace Design: Sizing the workplace to fit the body, standing/sitting, manipulation, reaching & grasping, handling loads,. General Principles of Workplace					1.5

	and Design, Work place evaluation tools- Rapid Upper Limb Assessment Tool. Controls & Displays: Controls, Guidelines for Control Layout and Design, Types of Controls, Displays, Types of Displays, Guidance on Color Coding in Displays, Summary.	
5	Biomechanics of Work: The musculoskeletal system, Bones and connective tissues, muscles, biomechanical model, single-segment planner static model, NIOSH lifting guide.	1.5
6	Heavy Work and Evaluating Physical Workloads and Lifting: Energy consumption during heavy work, energy efficiency of heavy work, effects of heavy work and heat, evaluation of physical workload, VO2max. Manual material handling & lifting: material handling, classification of manual material handling (task characteristics, material characteristics, work practice characteristics & worker characteristics), general ergonomics roles for lifting of loads. Fatigue: muscular fatigue, mental fatigue and shift work related fatigue, general fatigue and measuring fatigue.	2
7	Light and Moderate Work (all chapter)	
8	Workload and Stress: What is stress?, Stressor causes stress, Stress causes emotions, Stress at work & leisure, Eliminating stressors at work, Effect of stress, Measurement of stress, Mental workload, Physical Workload, Monotony & Boredom and Borg's Scales. Mental Workload Measurement: Measures of Primary and Secondary Task Performance, Physiological Measures, Psychophysical Assessment, Subjective Workload Assessment (NASA Task Load Index).	1.5
9	Muscular Work & Nervous Control of Movements: Introduction and background, Muscular Work: Muscular Contractile System, Mechanism of Contraction (Sliding Filament Model), Method to Stimulate and Control the Mechanism of Contraction, Energy That Drives Contraction, Innervations of the Muscular System: Efferent Nerves, Sensory Nerves. Reflexes, Energy Transformation Process for Muscle Activity, Types of Muscular Work, Muscular Fatigue, Types of Muscle Contractions, Summary.	1.5
10	Information Ergonomics: Introduction and background, Information Processing: Perception, Attention: Sustain attention, selective attention, focused attention, divided attention. Stimuli responses and reaction time.	1

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: (b) and (j)

Instructor or course coordinator: Dr. Abdulrahman Basahel

Last updated: February 2015