DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Occupational Biomechanics	**IE 444**	هـ ص ٤٤٤	3	1	-	3
Pre-requisites:	IE 342					
Course Role in Curriculum	*Required or Elective:*	Elective				

Catalogue Description:
Introduction to Occupational Biomechanics. Kinematics and kinetics. Anthropometry. Mechanical work-capacity evaluation. Bio-instrumentation for Occupational Biomechanics. Biomechanical models. Methods of classifying and evaluating manual work. Manual material handling limits. Biomechanical considerations in machine control and workplace design. Hand tool design guidelines. Guidelines for seated work.

***Textbooks*:**
OCCUPATIONAL BIOMECHANICS, (3rd edition), D.B. Chaffin, G.B.J. Andersson, and B.J. Martin, John Wiley, New Jersey, 2006, ISBN 978-0-471-72343-1

***References*:**

- **ERGONOMICS: HOW TO DESIGN FOR EASE AND EFFICIENCY**, (2nd edition), K.H.EKroemer, H.B. Kroemer and K.E. Kroemer-Elbert, (2000), Prentice Hall, New Jersey, ISBN 978-0137524785.
- **OCCUPATIONAL ERGONOMICS: PRINCIPLES & APPLICATIONS**, Tayyari, F. & Smith, J., (1997), Chapman & Hall: London. [SITE: www.thomson.com].
- **INTRODUCTION TO ERGONOMICS**, Bridger, R S, (1995), New York: McGraw Hill.

***Supplemental Materials*:**
Class notes/handouts materials provided by instructor

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

1. Explain the Basic Concepts of Occupational Biomechanics.
2. Solve for forces, moments and/or moment arms for a given free body diagram that is said to be in static equilibrium.
3. Estimate all required anthropometric values necessary in the equations of motion.
4. Model a given joint with appropriate anatomical structures and then calculate the muscular and joint reaction forces which are required to maintain static equilibrium in the joint.
5. List the risk factors for occupational low back, neck, hand/wrist, elbow, shoulder etc. injuries and be able to identify them in a given work situation.
6. Work in a Team and communicate effectively.

	Topics to be Covered:	***Duration in Weeks***
1	Definition of Occupational Biomechanics. Historical Development of Occupational Biomechanics. The Need for an Occupational Biomechanics Specialty. Who Uses Occupational Biomechanics?	1
2	Connective Tissue, Skeletal Muscle, Joints.	1
3	Measurement of Physical Properties of Body Segments, Anthropometric Data for Biomechanical Studies in Industry, Summary of Anthropometry in Occupational Biomechanics.	1
4	Joint Motion: Methods and Data, Muscle Strength Evaluation, Summary and Limitations of Mechanical Work-Capacity Data.	1
5	Why Model? Planar Static Biomechanical Models, Three-dimensional Modeling of Static Strength Dynamic Biomechanical Models, Special-purpose Biomechanical Models of Occupational Tasks	2
6	Traditional Methods of classifying and evaluating manual work, Traditional Work Analysis System, Contemporary Biomechanical Job Analysis	2
7	Lifting Limits in Manual Material Handling, Pushing and Pulling Capabilities, Recommendations for improving Manual Materials Handling Tasks	1
8	Practical Guidelines for Workplace and machine Control Layout, Maintaining the Facilities Plan	1
9	The Need for Biomechanical Concepts in Design, Shape and Size considerations, Hand-Tool Weight and Use Considerations, Force Reaction Considerations in Powered Hand-tool Design Keyboard Design Considerations	2
10	General Considerations Related to Sitting Postures, Anthropometric Aspects of Seated Workers, Comfort, The Spine and Sitting The Shoulder and Sitting, The Legs and Sitting, The Sitting Workplace	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 Mohammed Jomoah
Last updated: Jan. 2014