



Jordan University of Science and Technology
Faculty of Engineering
Biomedical Engineering Department

BME 544 Total Body and Occupational Biomechanics

Textbooks

David A. Winter. **Biomechanics and Motor Control of Human Movement**, 3rd edition.

Course Description and Objectives

3 Credit hours.

Quantitative and qualitative biomechanical analyses of human movement are studied from the perspective of kinematic and kinetic descriptions of multi-segment motion. These external phenomena are used to estimate internal muscle mechanics and joint loading. The purpose of this course is to introduce students to concepts of mechanics as they apply to human movement. The student should gain an understanding of the mechanical and anatomical principles that govern human motion and develop the ability to link the structure of the human body with its function from a mechanical perspective, with particular attention to pathological conditions and changes across one lifespan. At the completion of this course it is desired that each student be able to: 1) describe motion with precise, well-defined mechanical and biomechanical terminology; 2) understand and quantify linear and angular characteristics of motion; 3) understand the quantitative relationships between angular and linear motion characteristics of a rotating body; 4) understand and quantify the cause and effect of force, linear and angular kinetic of human movement; 5) interpret and analyze the kinematic, kinetic parameters and muscle activation of normal and pathological gait; 6) evaluate the biomechanical properties of common movement tasks.

Instructor

Instructor Alaa Alrashdan, **Ph.D**, E-mail: aarashdan@just.edu.jo

Prerequisites

Prerequisites by course Biomechanics (BME341)

Topics Covered

Topics	Chepters in Text
Introduction	Handouts
Anthropometry	CH4
Kinematics	CH3
Kinetics: Forces and Moments of Force	CH5
Mechanical Work, Energy, and Power	CH6

Evaluation

Assessment Tool		Expected Due Date
Weight		
Homework & Quizzes	According to director's instructions	10%
First Exam	According to the department schedule	25 %
Second Exam	According to the department schedule	25 %
Final Exam	According to the University final examination schedule	40 %

Objectives and Outcomes

Objectives	Outcomes
1. Understanding Posture and Balance.	1.1 Defining posture, balance and other related parameters to study human body mechanics [8,9]
2. Understanding Gait Cycle Biomechanics [1,6,8,9]	2.1 Defining Gait cycle and understanding its importance in addition to its phases and events [8,9] 2.2 Understanding differences between normal and abnormal gait cycle [6,8,9] 2.3 Defining main parameters used to evaluate gait cycle [1,6,8,9]
3. Learning Human body Joints classifications and functions	3.1 Learning different joint types and their role in human body movements [8,9] 3.2 Defining joint's range of motion and degrees of freedom [2,8,9]
4. Understanding Anthropometry [1,2,6,8,9]	4.1 Understanding Anthropometry and its uses in different fields [6,8,9] 4.2 Understanding Anthropometry applications in Biomechanics [6,8,9] 4.3 Applying Anthropometrical tables to find biomechanical measurements of human body [1,2,6,8,9]
5. Understanding Human body Kinematics [1,8,9]	5.1 Understanding Human body's linear and angular displacement, velocity and acceleration [1,2,6,8,9] 5.2 Learning how to Use markers coordinates to calculate such parameters [1,2,6,7,8,9]
6. Understanding human body Kinetics	6.1 Understanding human body's Forces and Moments [1,2,6,8,9] 6.2 Learning how to Use markers coordinates in addition to force plates output to calculate joints forces and moments [1,2,6,7,8,9]
7. Understanding Mechanical Work, Energy, and Power	7.1 Understanding Mechanical Work, Energy, and Power and learning how to calculate them using experimental data [1,2,6,7,8,9]

Contribution of Course to Meeting the Professional Component

The course contributes to building the fundamental basic concepts, applications, and design of biomechanics and lays the foundation for more advanced courses such as biomaterials.

Relationship to Program Outcomes (%)

1	2	3	4	5	6	7	8	9
50	5				20	5	15	5

Relationship to Biomedical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO 4
√		√	√

Prepared by:

Alaa Alrashdan, Ph.D

Last Modified:

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