

Course Syllabus

Course: *Biomechanics in Rehabilitation*

Department: *Health Sciences*

Host Institution: *University of Nicosia, Cyprus*



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Semesters

Course Summary

Course Code	Course Title	ECTS Credits
PTHE-305E	Biomechanics in Rehabilitation	6
Subject	Contact Hours	Prerequisites
Physical Therapy	42-45	none
Department	Level of Course	Language of Instruction
Health Sciences	Upper-Division	English

Course Description

This course aims to offer an understanding of kinematic (displacement, time, speed, velocity, etc.) and kinetic (forces, moments, load distribution) variables of human movement and the ways and tools to evaluate and quantify them. In addition, students will learn to appreciate the different forms of loading in the living tissues and the mechanical, the biological and the biochemical effect they have on tissue homeostasis. Last but not least, the aim of this course is to provide the students the necessary understanding of how to use the knowledge of tissue loading in real practice when they are called to design ergonomic and therapeutic interventions in order to prevent or rehabilitate injuries or facilitate performance.

Prerequisites (if applicable)

none

Learning Outcomes

At the end of the **theoretical part** of the module, students will be able to:

1. Understand the different kinetic and kinematic variables of human movement and
2. how to evaluate them both quantitatively and qualitatively
3. Recognize and appreciate the mode of loading in various structures and tissues of the human body during movements, activities or postures
4. Predict the effect of a particular mode of loading in biological tissues and the probability of injury
5. Understand and explain (in scientific and lay language) terms like stress, strain, fatigue, overuse, stress adaptation etc after the application of a loading regimen
6. Understand and implement the basic principles of ergonomics and occupational loading in their assessment and treatment repertoire
7. Analyze relevant biomechanical and physiological data and create reports efficiency of human movement
8. Develop the necessary knowledge to understand the relevant literature in order to increase its knowledge in the field of human biomechanics

At the end of the **practical part** of the module, students will be able to:

1. Analyze movements in various planes and axis and determine the mode of loading sustained by different structures of the human body.
2. Assess and modify mechanical loading in order to prevent or rehabilitate musculoskeletal problems resulting from occupational loading
3. Appreciate the magnitude of mechanical loading in sporting and everyday activities and suggest ways or strategies to reduce it

Course Outline

1. Introduction to basic terms of biomechanics (forces, moments, Newton's Laws of movement, moment arms, levers, axis and planes of movement, forces couples, kinematics, kinetics, osteokinematics, arthokinematics, stability, etc)
2. Parameters of tissue loading (magnitude, repetition, frequency, resting time, distribution or concentration of load, stress shielding, etc)
3. Mechanical properties of tendons, ligaments, bones, articular cartilage, intervertebral disc and nerves
4. Basic principles of ergonomics, ergonomic assessment and intervention in the workplace
5. Biomechanics and evaluation of human gait
6. Stability of joints and its requirements
7. Biological, Biochemical and mechanical implications of tissue loading
8. Overuse and fatigue syndromes and preventative strategies

Evaluation and Grading

Midterm Exam: **30%**

Participation: **10%**

Final Exam: **60%**

Readings and Resources

Authors	Title	Publisher	Year	ISBN
Neumann D.	Kinesiology of the Musculoskeletal System, 2 nd Ed	Mosby	2010	9780323039895
Nordin M. and Frankel V.H.	Basic biomechanics of the musculoskeletal system. 4 th Ed	Lippincott Williams & Wilkins	2012	978609133351
Susan Hall	Basic Biomechanics 6th Ed.	McGraw-Hill	2011	978-0073376448
Enoka Roger	Neuromechanics of Human Movement-4th Edition	Human Kinetics	2008	978-0736066792

Other Academic Policies

Class attendance is compulsory. If unable to attend a class, students must inform the course lecturer in advance. A maximum of 20% excused absences is tolerated; however beyond this percentage, students will be withdrawn from the course. Moreover, any work missed due to absence must be completed on return to class.