HLTH 2003 BIOMECHANICS

Credit Points 10

Legacy Code 401140

Coordinator Peter Clothier (https://directory.westernsydney.edu.au/search/name/Peter Clothier/)

Description The study of biomechanics, the science that examines the forces acting upon a structure and the effects of these forces, is essential for understanding how the human body moves during daily activities, exercise and sport. It is also important when considering where problems may arise with human movement, such as with disease processes, over exercising and injury and postural pathology. This subject is designed to introduce the student to biomechanics by studying: the mechanical principles of human movement: balance and equilibrium: mechanical factors involved in tissue type and motion; and the analysis of human movement.

School Health Sciences

Discipline Human Movement

Student Contribution Band HECS Band 4 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Equivalent Subjects BIOS 2004 - Biomehanics and Kinesiology HLTH 2008 - Introduction to Biomechanics

Restrictions

Students must be enrolled in 4656 Bachelor of Health Science, 4658 Bachelor of Health Science (Sport and Exercise Science), 4661 Bachelor of Health Science/Master of Podiatric Medicine, 4662 Bachelor of Health Science/Master of Physiotherapy, 4706 Bachelor of Physiotherapy, 4707 Bachelor of Physiotherapy (Honours), 4708 Bachelor of Podiatric Medicine, 4709 Bachelor of Podiatric Medicine (Honours) or 6000 Diploma in Health Science/Bachelor of Health Science

Assumed Knowledge

It is assumed that students have knowledge of structural and functional anatomy of the human body. Students also need to be able to apply basic concepts in maths and physics.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Define and explain terms, principles and units of measurement that apply to the biomechanics of motion, sport and exercise.
2. Apply biomechanical principles as they relate to the description and analysis of motion, sport and exercise.
3. Solve quantitative problems related to kinematic and kinematic concepts.
4. Describe and illustrate examples of linear and angular analogues of Newton's Laws of motion.
5. Identify and explain fluid mechanics principles as they apply to motion.
6. Illustrate and explain the biomechanical properties of human tissues, how these tissues respond to loading and how problems to the tissue may affect tissue functioning.
7. Recall and describe concepts relating to the biomechanical analysis human gait and locomotion

Subject Content

1. Introduction to Biomechanics

- Terminology & definitions
- Principles of Motion
- Qualitative Vs quantitative Motion
- SI units

2. Introduction to Physics

- Mass, inertia, laws of Motion, density, Force, torque, impulse
- Mechanical loading
- Contact and non-contact forces
- Friction
- Introduction to levers
- Levers in The human body
- Centre of gravity, Balance and stability

3. Biomechanics of Human Tissue

- Definitions
- Plasticity and Elasticity
- Stress and strain
- Shear-strain diagrams
- Bone
- Muscle and tendon
- Articular cartilage
- Synovial joints
- Effects of immobilisation
- Effects of disease processes

4. Mechanics in action

- Moments, Moments of inertia, momentum
- Conservation of momentum
- Rotatory Equilibrium
- Collisions, impact and impulse
- Projectile Motion: biomechanics of throwing and kicking

5. Fluid Mechanics

- Fluid forces
- Buoyancy, lift and drag
- Air patterns and ball spin

6. Linear and angular Kinematics

- Scalar, Vectors and tensors
- Force Vectors concept
- Torque and moment Vectors concept
- Normal and sheer stresses
- Introduction to angular and linear kinematics
- Collecting kinematic data

7. Linear and angular Kinetics

- Levers
- Axes of rotation
- Free body diagrams
- Calculating kinetics

8. The Gait Cycle

- Events in The gait cycle
- Muscle activation and sequencing
- Joint range of Motion
- Gait cycle in running
- Gait cycle in patient populations (eg amputees; rheumatoid arthritis, older population)

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Quiz	Up to 30 mins	20	N	Individual	N
Presentatio	15 mins	30	N	Group	Y
Final Exam	1 hour 45 minutes	50	N	Individual	Y

Teaching Periods

Autumn (2025)

Campbelltown

On-site

Subject Contact Peter Clothier (https://directory.westernsydney.edu.au/search/name/Peter Clothier/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=HLTH2003_25-AUT_CA_1#subjects)