

Course Syllabus

2nd semester 2012/2013

Course Title: Kinesiology

Course Number: RHS 341

Credit Hours: 2 Theory + 1 Practical = 3 hours

Cours Instructor: Mrs. Lulu Al Rashed+ Asma Alderaa

Course Description: This course deals with the mechanics of human motion from a functional anatomy perspective. Special emphasis will be given on the nature of the musculoskeletal system, differences between normal and abnormal posture, as well as analysis of gait (locomotion).

Course Objectives: Upon completion of this course, the student should be able to:

1. Demonstrate knowledge of anatomical and physiological fundamentals of human movement
2. Demonstrate knowledge of the fundamentals of kinesiology.
3. Identify the principles and applications of motor skills.
4. knowing the major muscle groups used in athletic activities, their origin, insertion, and function.
5. Determine types of force and resistance of movement.
6. Classify different types of levers.
7. Describe the forces involved in different levers.
8. Define Balance, Equilibrium, & Stability.
9. Able to analyse normal posture and description of any abnormality.
10. Ability to analyse normal gait kinesiologicaly and find any abnormalities.

Course Outline

Week 1 (Jan. 26)

Movement Terminology & Biomechanical Principles:

- Kinesiology: what &why?
- Reference position
- Anatomical directional terminology
- Planes of motion
- Axes of rotation
- Movements in joints
- Kinetics versus Kinematics

Week 2 (Feb. 2)

Skeletal Considerations for Movement:

- Functions of the skeletal system
- Architecture of bone
- Types of bones
- Types of joints
- Degrees of freedom (joint motion)
- Close-packed versus Loose-packed position
- The kinetic chain: open versus closed
- The Kinematic chain

Week 3 (Feb. 9)

Muscular Considerations for Movement:

- Types of muscle contraction (Isometric, Isotonic: Eccentric & Concentric)
- Role of muscles (agonist, antagonist, stabilizers, synergists, neutralizers)
- Origin versus Insertion
- Arrangement of fascicles
- Isokinetic exercises
- Muscle strength & electromyography

Week 4 (Feb. 16)

1- Definition of Force lecture IV-1-2

Laws of motion and physical activities:

- Linear (translatory) versus Angular (rotatory) movement
- Displacement versus Distance
- Speed versus Velocity

Week 5 (Feb. 23)

2- Definition of Force lecture IV-2-2

Basics of Kinetics / Force:

- Newton's laws:
 - 1) Law of inertia,
 - 2) Law of acceleration,
 - 3) Law of reaction

Week 6 (March 2)

Basics of Kinetics / Force:

- Internal versus external forces
- Composition of forces
- Force systems
- Force analysis
- Resolution of forces
- Torque or moment of force
- Work, Power, Energy

Week 7 (March 9)**1st Midterm examination****Week 8 (March 16)****Basic Biomechanical Concepts:**

- Levers (first-class, second-class, third-class)
- Factors affecting anatomical levers (Torque, Length of lever arm, Angle of pull)
- Mechanical advantage
- Laws of Levers
- Differences between levers

Week 9 (March 23)**Mid term vacation****Week 10 (March 30)****Balance, Equilibrium, and Stability:**

- Definitions
- Static versus Dynamic equilibrium
- Center of gravity
- Base of support
- Factors contributing to stability
- Factors for achieving balance

Week 11 (April 6)**Posture:**

- Factors affecting posture
- Static versus dynamic posture
- Posture and life cycle
- Standing posture
- Sitting posture
- Lifting
- Postural sway

Week 12 (April 13)**Postural Deviations:**

- Faulty posture
- Scoliosis
- Kyphosis
- Lordosis
- Postural re-education (physiotherapy intervention)
- Establishment of neuromuscular control (conscious versus automatic control)

Week 13 (April 20)

2nd Midterm examination

Week 14 (April 27)

Gait:

- Gait versus locomotion
- Prerequisites of gait
- Gait cycle
- Phases of gait
- Role of the lower limb muscles in gait (normal pattern)
- Ground reaction force vector
- Gait analysis (assessment)

Week 15 (May 4)

Pathological gait:

- Causes of abnormal gait
- Weakness of hip extensors
- Weakness of hip abductors
- Weakness of knee extensors
- Weakness of dorsiflexors
- Weakness of calf muscles
- Examples of abnormal gait: (shuffling gait, high stepping gait, spastic gait, hemiplegic gait, waddling gait, trendelenburg gait)
- Correction of gait
- Crutches gait

Week 16 (May 11)

Practical Final Exam

Week 17 (May 18)

General Revision

Week 18 (May 25)

Final Examination

Methods of evaluation:

2 Theoretical midterm exams 2 X 20% = 40%

1 Practical midterm exam 10% = 10%

Assignments + continuous evaluation 2 X 5% = 10%

1 Practical Final exam 1 X 15% = 15%

1 Theoretical Final exam 25%

References:

1. Floyd RT & Thompson CW. Manual of Structural Kinesiology, 14th ed. McGraw-Hill; 2001. [Chapters 1 & 12]
2. Hamill J & Knutzen KM. Biomechanical Basis of Human Movement, 2nd ed. Lippincott Williams & Wilkins; 2003. [Chapters 2, 3, 6, & 10]
3. Tyldesley B & Grieve JJ. Muscles, Nerves and Movement, 2nd ed. Blackwell Science Ltd; 1996. [Chapters 2 & 10]
4. Smith LK, Weiss EL, & Lehmkuhl LD. Brunnstrom's Clinical Kinesiology, 5th ed. Jaypee Brothers; 1998. [Chapter 12]
5. Galley PM & Forster AL. Human Movement: An Introductory Text for Physiotherapy Students, 2nd ed. Churchill Livingstone; 1987. [Chapters 5, 6, & 22]
6. Jenkins DB. Hollinshead's Functional Anatomy of the Limbs and Back, 7th ed. WB Saunders Company; 1998.
7. Porter S. Tidy's Physiotherapy, 13th ed. Butterworth Heinemann; 2003. [Chapter 6]
8. Tidswell M. Orthopaedic Physiotherapy. Mosby International Limited; 1998. [Chapter 3]
9. Hamilton N & Luttgens K. Kinesiology: Scientific Basis of Human Motion, 10th ed. McGraw Hill Companies; 2