

26001 - Kinesiology and human biomechanics

Información del Plan Docente

Academic Year	2016/17
Academic center	127 - Facultad de Ciencias de la Salud
Degree	276 - Degree in Occupational Therapy
ECTS	8.0
Course	1
Period	Annual
Subject Type	Basic Education
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

5.2. Learning activities

5.3. Program

SECTION I: BIOMECHANICS

UNIT 1. INTRODUCTION TO KINESIOLOGY. Definition and concept of Kinesiology. Historical development of

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Kinesiology. Objectives of Kinesiology.

UNIT 2. INTRODUCTION TO BIOMECHANICS. Static and dynamic, Kinetics and Kinematics. Magnitudes biomechanics.

UNIT 3. FORCES. Definition and representation of forces. Units of measurement. Composition and resolution of forces. Moment of force. Application to muscle forces.

UNIT 4. MOVEMENT. Definition and classification. Linear and angular kinematics. Newton's laws of motion. Application to the analysis of human movement.

UNIT 5. WORK, POWER AND ENERGY. Concept of work, power and energy. Potential energy and kinetic energy. Measurement units.

UNIT 6. LEVERS AND PULLEYS. Levers. Concept. Classification. The principle of levers. Anatomical levers. Pulleys. Concept. Types of pulleys. Anatomical pulleys. Applications in Occupational Therapy.

UNIT 7. BALANCE AND STABILITY. Center of gravity of the human body. Line of gravity. Support base. Balance. Types of balance. Stability of equilibrium: factors influencing this stability.

SECTION II: ANATOMICAL AND PHYSIOLOGICAL BASIS OF HUMAN MOVEMENT

UNIT 8. BONES. Composition, structure and function. Mechanical laws governing bone growth.

UNIT 9. JOINTS. Concept and structural classification of joints. Joint stability. Orientation axes and planes of movement. Factors affecting range of motion. Assessment of the range of motion. Methods for measuring joint mobility: Goniometry. Study of active and passive mobility.

UNIT 10. SKELETAL MUSCLES. Structure and properties. Structural and functional classification of muscles. Muscle contraction. Types of muscle contraction. Muscular biomechanics. Muscle Testing: Techniques of Manual Examination

UNIT 11. NEUROMUSCULAR BASIS OF HUMAN MOVEMENT. Voluntary and reflex movements. Proprioceptive neuromuscular facilitation.

UNIT 12. CADENAS. Kinetic chains: Concept and Classification. The kinetic chain as facilitator of the movement.

SECTION III: KINESIOLOGY OF THE UPPER EXTREMITY

UNIT 13. KINESIOLOGY OF THE SHOULDER. Structure and movements of the shoulder joints, its breadth and the factors that limit. Movements of the shoulder girdle. Muscles involved in the movements of the shoulder and girdle: location, features and functions. Measurement and evaluation of joint and muscle of the shoulder complex.

UNIT 14. KINESIOLOGY OF THE ELBOW. Forearm and elbow joints: structure and movements. Muscles involved in movements of the elbow and the pronosupination: location, features and functions. Measurement and evaluation of joint and muscle of elbow and pronosupination.

UNIT 15. KINESIOLOGY OF THE WRIST. Structure and movements. Muscles involved in them: location, features and functions. Measurement and evaluation of joint and muscle of the wrist.

UNIT 16. KINESIOLOGY OF THE HAND. Structure and movements. Muscles involved in movements of the joints of the last four fingers: location, features and functions. The thumb: movements. Motor muscles of thumb: location, features and functions. Gripping. Muscles involved in different types of grip. Evaluation of joint and muscle of the fingers.

SECTION IV: KINESIOLOGY OF THE LOWER EXTREMITY

UNIT 17. KINESIOLOGY OF THE HIP. Structure and movements. Articular coaptation factors. Muscles involved in the movement of the hip: location, features and functions. Measurement and evaluation of joint and muscle of the hip. Relationship between hip joint, pelvic girdle and lower spine.

UNIT 18. KINESIOLOGY OF THE KNEE. Structure and movements. Lateral and cruciate ligaments: their physiology. Transverse, anteroposterior and rotational stability of the knee. Muscles involved in the movement of the knee: location, characteristics and function. Measurement and evaluation of joint and muscle of the knee.

UNIT 19. KINESIOLOGY OF THE ANKLE. Structure and movements. Anteroposterior and transverse stability. Muscles acting on ankle movements: location, features and functions. Measurement and evaluation of joint and muscle of the ankle.

UNIT 20. KINESIOLOGY OF THE FOOT. Structure and movements. Muscles acting on the foot movements: location, features and functions. Muscle and joint analysis of the movements of the foot. The plantar vault: its architecture. Plantar arches. Distribution of static loads and deformations of the plantar arch. Exploration of the foot.

SECTION V: KINESIOLOGY OF THE TRUNK

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UNIT 21. KINESIOLOGY OF THE SPINE. Structure and joints of the spine. Intervertebral disc structure. Spinal curves. Functional divisions of the spine. Muscles involved in the movement of the spine: location, features and functions. Global movements of the spine. Compressive forces on the disc. Behavior of the intervertebral disc in the elementary movements.

UNIT 22. KINESIOLOGY OF THE CERVICAL SPINE. Division, structure and movements. Functional assessment of the muscles involved in movements of the cervical spine and head. Exploration of the cervical spine.

UNIT 23. KINESIOLOGY OF THE THORACIC SPINE. Structure and movements. Movements of the ribs around the cost-vertebral joints. Muscles involved in trunk movements: location, features and functions. Exploration. Antagonism-synergy of the diaphragm and abdominal muscles.

UNIT 24. KINESIOLOGY OF THE LUMBAR SPINE. Structure and movements. Range of motion of the lumbar spine. The intervertebral disc: mechanisms and compression of lumbar nerve root. Functional assessment of the muscles involved in the movements of the lumbar spine. Exploration of the lumbar spine.

UNIT 25. KINESIOLOGY OF THE PELVIC GIRDLE. Joint structure of the pelvis. Movements of the pelvic girdle: muscles involved. Anteroposterior and transverse stability of the pelvis. Position influence on the joints of the pelvic girdle.

SECTION VI: KINESIOLOGICAL ANALYSIS OF MOTOR SKILLS

UNIT 26. APPROACH TO THE KINESIOLOGICAL ANALYSIS OF MOTOR SKILLS.. Laboratory techniques for motion analysis: visual analysis, kinematic analysis, kinetic analysis techniques.

UNIT 27. KINESIOLOGY OF STANDING POSTURE. Evolution and development of the erect posture. Polygon lift in standing position. Alignment of body segments. Muscle activity in standing position. Neuromuscular mechanisms for maintaining upright posture. Principles of good posture.

UNIT 28. BACK SCHOOL. Definition. Lifting loads. Manipulation of an object located higher than the head. Sitting and lying positions. Distribution of the workspace. Prevention of workplace fatigue.

UNIT 29. KINESIOLOGY OF NORMAL HUMAN GAIT. Concept. The gait cycle: phases and periods. Energy expenditure during walking: optimization mechanisms. Gait kinetics. Gait kinematics. Muscle actions during walking.

UNIT 30. KINESIOLOGY IN EXERCISE PROGRAMS. Muscular Strength. Muscular Endurance. Flexibility. Exercises and principles to increase strength and muscular endurance. Exercises and principles of flexibility.

5.4.Planning and scheduling

5.5.Bibliography and recommended resources