

Core Level 3 Instructing Physical Activity and Exercise Knowledge Requirements

SVQ/NVQ Instructing Physical Activity and Exercise Knowledge Requirements

The following provides the underpinning knowledge for the core units of the SVQ/NVQ in Instructing Physical Activity and Exercise

When completing the Level 3 Instructing Physical Activity and Exercise in the context of Pilates there are additional knowledge requirements Annex I (Mat Pilates Specific Knowledge Requirements)

1. Behaviour Change
2. Anatomy
3. Functional Kinesiology
4. Energy Systems and Nutrition
5. Concepts and Components of Fitness

I. Behaviour Change

- Client history and attitude to exercise
 - Identifying and understanding the psychological benefits of exercise
 - Identifying the potential barriers to exercise participation
 - Principles of behavior change - Stages of Change Model (Prochaska and DiClemente)
 - Motivational and exercise adherence strategies:
 - programming/prescription strategies
 - the principles of motivational interviewing
 - behavioral and outcome goal setting
 - social support
 - social reinforcement
 - attentional strategies
- Intervention / Motivational methods appropriate for each stage of change of behaviour change
 - Understanding why people relapse and relapse prevention strategies

2. Anatomy

Bones and Joints

- Three anatomical axis and planes
 - Explain / label each plane and be able to describe movement in relation to the plane
- Three types of joints (fibrous, cartilaginous, synovial)
 - The characteristics of each joint
 - Examples of each joint
 - Stability vs movement within each type of joint
- Structure of synovial joints
 - Ligaments, articular cartilage, joint cavity, synovial membrane, synovial fluid
 - Structure and movement potential / anatomical limitations of major joints (shoulder, hip, knee and elbow)
 - Different types of synovial joints and their movement potential
- Five types of bone
 - Structure and proportion of compact / cancellous bone
 - Typical location / role within the body
- Structure of long bone
 - Diaphysis, Epiphysis, Epiphyseal Plate, Periosteum, Medullary Cavity, Cartilage, Compact Bone, Cancellous Bone
 - Susceptibility to breakage / damage – epiphysis vs diaphysis
- Growth of a long bone
 - Ossification process pre-natal through childhood to adulthood
 - The role of osteoblasts and osteoclasts
 - Hormonal regulation of bone growth
 - Key nutrients in bone growth
 - Calcium regulation
 - Bone remodelling
 - Osteoporosis
- Names of all major bones
 - Axial Skeleton
 - Cranium
 - Cervical Vertebrae
 - Thoracic Vertebrae
 - Lumbar Vertebrae
 - Sacral Vertebrae
 - Sternum
 - Ribs
 - Coccyx
 - Pubis
 - Appendicular Skeleton
 - Scapula
 - Clavical

- Humerus
- Ulna
- Radius
- Carpals
- Metacarpals
- Phalanges
- Ilium
- Ischium
- Femur
- Patella
- Tibia
- Fibula
- Tarsals
- Metatarsals
- Articulations and joint movements
- Muscle attachment sites
- Joint actions (flexion, extension, hyper-extension, adduction, abduction, elevation, depression, lateral flexion, horizontal flexion and extension, plantar flexion, dorsiflexion, internal and external rotation, circumduction, pronation, supination, eversion, inversion)
- The skeletal system (axial and appendicular skeleton)
 - Structure and function of each part
- Structure of the spine, postural deviation
 - 5 Curves of the skeleton
 - Number and structure of vertebrae in each section
 - The vertebral foramen
 - Structure and function of vertebral discs
 - Facet joints
 - Kyphosis, lordosis and scoliosis
 - Neutral Spine
 - Surrounding ligaments and their role

Muscles

- Three types of muscle (cardiac, smooth, skeletal)
 - Cardiac
 - The myocardium
 - Myocardial ischaemia – immediate impact of lack of oxygen
 - Oxygen delivery to the myocardium during exercise
 - Smooth
 - Autonomic nervous system regulation
 - Controlling blood pressure
 - Skeletal
 - Structure and function of skeletal muscle (to include epimysium, perimysium, endomysium)

- Collagen
 - Proprioceptors and their function (muscle spindle cells, golgi tendon organs)
 - Muscle fibre types
- Names of all major muscles and their origin and insertion:
 - Sternocleidomastoid
 - Pectoralis Major
 - Deltoid
 - Biceps Brachii
 - Rectus Abdominus
 - Obliques
 - Transverse Abdominus
 - Trapezius
 - Rhomboids
 - Triceps
 - Latissimus Dorsi
 - Erector Spinae
 - Hip Flexors
 - Quadriceps
 - Adductors
 - Anterior Tibialis
 - Gluteals
 - Abductors
 - Hamstring
 - Gastrocnemius
 - Soleus
- Muscle shape and actions
 - Fibre direction and role of muscle
- Muscle contraction
 - The motor unit
 - Axon terminals
 - The sliding filament theory
 - All-or-none law of muscle physiology
 - Muscle fatigue and oxygen debt
- Types of muscle contraction (concentric, eccentric, isometric, isotonic and isokinetic)
- Joint actions and muscle contraction
- Agonists, antagonists, synergists and fixators applied to a range of exercises
- Delayed onset muscle soreness (DOMS)
- Three somatotypes (endomorph, ectomorph, mesomorph)

Cardio-respiratory System

- Anatomy of the heart
 - The four chambers
 - Valves and control of blood flow

- The cardiac cycle
- Conduction Systems (autonomic and intrinsic)
- Cardiac output (regulation of stroke volume and heart rate)
- Cardiac circulation
- Anatomy of the lungs
 - Structure of lungs and airways
 - Inspiration and expiration (including role of the diaphragm and intercostals muscles)
 - Breathing regulation (respiratory centre – hypothalamus, and cerebral cortex)
- Structure, function and characteristics of arteries, arterioles, veins and capillaries
- Coronary circulation
- Systemic circulation
- Pathway of oxygen from inhaled air to muscle
- Pathway of carbon dioxide from muscle to exhaled air

Nervous Systems

- Role of the nervous system
 - sensory input
 - interpretation
 - major output
- Two parts of the nervous system
 - Central Nervous System (CNS)
 - Peripheral Nervous System (PNS) (autonomic and somatic)
- How regular activity can enhance neuromuscular connections and improve motor fitness

3. Functional Kinesiology

- Basic biomechanical principles and movement (1st, 2nd and 3rd class levers)
- Joint actions and muscle actions in relation to a range of exercises/ activities
- Postural muscles and core stability
- Anatomy of muscular and mechanical systems associated with Core Stability:
 - Sections of the spine
 - Function of respective sections
 - Local and global stabilising muscles
 - Fibre type overview of local and global muscles
 - Ligamentous structures of the spine
 - Pelvis structure and associated muscles and ligaments
- Fundamental principles of Core Stabilisation
- The glute complex and its role in stabilisation of the spine and reducing the risk of low back pain
- The use of stabilisation equipment

- Local muscle changes associated with lack of specific stabilisation exercise:
 - Lack of postural control
 - Potential for back pain
 - Above effects due to sedentary lifestyle
 - Above effects due to reliance on supporting structures for posture
- Exercises associated with Core Stabilisation:
 - Methods of contraction of Transversus Abdominis
 - Methods of abdominal bracing
 - Stability equipment exercises
 - Floor based exercises
 - Reasons for participant exclusion
- The range of medical conditions common in back pain patients which may be aggravated by physical activity or lead to injury

4. Energy Systems and Nutrition

- Adenosine Triphosphate (ATP)
- Three energy systems
 - CP, anaerobic, aerobic
 - Interaction of the energy systems during a range of exercises/ activities
 - Capacity of the three energy systems and adaptations in relation to training modalities
 - Effects of exercise intensity, duration and fitness levels on the energy systems used
- Monitoring exercise intensity
 - Rate of Perceived Exhaustion (RPE), talk test, heart rate monitoring
 - Benefits and limitations of each method
- The dietary role of the main nutrients:
 - carbohydrates
 - fats
 - proteins
 - vitamins
 - minerals
 - water
- The common dietary sources of the main nutrients
- Examples of food items in each of the basic food groups
- Use of energy nutrients at different intensities and amount of energy nutrients used at different intensities
- Appropriate sources on information on lifestyle aligned to current government advice
- Recommended healthy approach to a balanced eating plan for general nutrition

5. Concepts and Components of Fitness

- Definitions of fitness
 - physical fitness
 - health-related fitness
 - wellness)
- Components of fitness and how they can be assessed
 - aerobic capacity
 - muscular strength
 - muscular resistance
 - flexibility
 - body composition
- Principles of fitness including Frequency, Intensity, Time and Type (FITT) principles, overload, specificity, reversibility
- American College of Sports Medicine (ACSM) guidelines for developing each component of fitness
- Continuum between muscular strength and muscular endurance
- Rep ranges for strength, power, endurance, hypertrophy
- Muscle physiology changes between exercise sessions
 - Increased mitochondria, oxidative enzymes and capillaries
- Heart rate training zones
- Principles and practice of resistance training systems, for example:
 - single set training
 - circuit resistance training
 - giant sets
 - Delorme and Watkins
 - Berger
 - super setting
 - pyramid training
 - forced repetitions
 - plyometrics
- Principles and practice of cardiovascular training systems, for example:
 - interval
 - Fartlek
 - continuous
 - random
- Methods of flexibility training (static, ballistic, dynamic Proprioceptive Neuromuscular Facilitation (PNF) and contract, relax antagonist, contract (CRAC))
- Principles of periodisation
 - Macro, meso and micro cycles
 - Volume vs intensity through the cycles
- Importance of rest and signs and symptoms of over-training
- Coronary heart disease risk factors