Australian Government

Assessment Requirements for SISFFIT029 Apply anatomy and physiology to advanced personal training

Release: 1

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Modification History

Not applicable.

Performance Evidence

Evidence of the ability to complete tasks outlined in elements and performance criteria of this unit in the context of the job role, and:

- effectively use knowledge of the following body systems to improve own instructional practice to plan and instruct at least five functional training programs:
  - nervous system
  - musculoskeletal system
  - endocrine system
  - cardiorespiratory system
- conduct sessions that individually or cumulatively incorporate:
  - types of training:
    - strength
    - speed
    - plyometric
    - balance
    - stability
    - coordination
  - evidence for the physiological responses of the major body systems
  - variations in exercise technique
  - fitness testing with clients performing high-intensity exercise to determine the physiological responses of the major body systems
  - analysis of client movement capacity to support safe exercise participation in high intensity programs.

Knowledge Evidence

Demonstrated knowledge required to complete the tasks outlined in elements and performance criteria of this unit:

- industry endorsed pre-exercise screening and risk stratification protocols
- industry endorsed risk stratification procedures, exercise implications and referral requirements
- methods of determining fitness levels of clients, and the appropriate exercise intensity and programming to achieve desired goals

- screening of movement capacity to determine complexity and loading of exercises
- characteristics of high intensity exercise:
  - mechanical stress
  - overload
  - fatigue/failure
  - high intensity aerobic, anaerobic and strength training methods
  - single bout versus longer term exposure
- characteristics of functional training
- considerations and responses to high intensity exercise and mechanical stress:
  - musculoskeletal:
    - structure and mechanics of bone, muscle and connective tissue
    - biomechanical properties of bone
    - acute and chronic musculoskeletal responses to aerobic, anaerobic and strength training
    - responses of bone and muscle tissue to weight bearing activities
    - bone remodelling
    - muscle tissue damage and repair
    - ligament and tendon strength
  - neuromuscular:
    - main features of nerves and nervous system related to exercise
    - nervous system classification and structure
    - afferent and efferent nervous system signals
    - voluntary and involuntary nature of nervous system
    - structure of a motor neuron
    - conduction of a motor impulse
    - types of muscle contraction and relationship between muscle force and external location
    - size principles of muscle and nervous system activation
    - muscle fibre types and relative involvement in different types of exercise and training programs
    - acute and chronic neuromuscular responses to aerobic, anaerobic and strength training
    - central
    - adaptations of motor units, including size principles and selective recruitment
    - muscle growth
    - muscle fibre type changes
    - structural and architectural changes to muscles
    - connective tissue adaptations
    - change in cross sectional area
    - nerve-muscle connections

- timing of contractions
- resistance to fatigue
- capillary density
- mitochondrial density
- motor learning

- physiological:
  - acute and chronic physiological adaptations to aerobic, anaerobic and strength training
  - heart rate response
  - blood volume
  - blood pressure
  - stroke volume
  - cardiac output
  - oxygen capacity
  - body system response
  - regulations of blood flow during exercise
  - shifts in distribution of blood to various areas of the body during exercise
  - energy metabolism/depletion
  - the transfer of metabolites between blood and muscles
  - substrates used by each energy system and patterns of substrate depletion and repletion with various activities
  - ammonia and lactate metabolism
  - mitochondrial adaptations to fuel utilisation (including transport and metabolism)
  - glucose control
  - recovery
  - thermoregulation/dehydration/hyperthermia
  - sodium
  - fatigue
  - homeostasis
- endocrine system:
  - role of receptors in mediating hormonal changes
  - acute and chronic hormonal responses to resistance training and cardiovascular training
  - growth hormone
  - insulin
  - adrenal hormones
  - acute responses and chronic adaptations of the endocrine system to anaerobic training
  - endocrine system adaptations to fatigue
- cardiovascular system:

    - structure and function of the respiratory system
    - exchange of air
    - inspiration and expiration at rest and during exercise
    - exchange of respiratory gases
    - structure and function of the cardiovascular system
    - anatomical components
    - circulation pathways
    - role of blood
    - oxygen demands of exercise and activities of daily living
    - relationships between exercise intensity and circulatory and ventilator responses
    - adaptations to short term and long term training
    - role in strength and conditioning programs
    - acute and chronic adaptations of the cardiovascular and respiratory systems to aerobic, anaerobic and strength training
    - acute responses and chronic adaptations of the cardiovascular and respiratory systems to anaerobic training
- structural anatomy:
    - names and locations of bones
    - major bones and major landmarks of the skeleton
    - bone markings
    - names, locations and types of joints
    - anatomical structure of joints
    - function of major joint complexes:
        - shoulder girdle
        - elbow
        - wrist
        - vertebral column
        - pelvic girdle
        - knee
        - ankle
    - major muscles and connective tissues acting on joints during exercise
    - structure and function of local and global skeletal muscles
    - macrostructure of skeletal muscle
- functional anatomy:
    - regulation of muscle function
    - factors influencing muscle contraction
    - muscle spindles
    - golgi tendon organs
    - cross bridge cycle and its phases neurological activation of muscles
    - motor unit recruitment

- reciprocal inhibition, including agonist and antagonist relationship
- role of reflex arcs in balance, coordination and proprioception
- motor learning
- motor unit recruitment patterns during exercise
- preloading
- proprioceptors and proprioception training
- neural innervation of muscles for movement and proprioception
- motor unit innervation
- phases of the stretch shortening cycle

- movement considerations in resistance training:
  - neural control
  - muscle cross-sectional area
  - arrangement and type of muscle fibres
  - muscle length
  - joint angle
  - muscle contraction velocity
  - joint angular velocity
  - strength to mass ratio
  - length-tension relationship
  - mechanics advantage of joint position
  - force-velocity relationships
  - body size
  - various types of levers and pulley systems and applications to training
  - factors contributing to human strength and power
  - resistive forces and power patterns of exercise devices
  - methods of minimise injury risk during resistance training
- impact of pain, injury or disease on neuromuscular function:
  - CNS and PNS adaptations to tissue injury relating to pain
  - reflex modulation of posture
  - perception of posture and movement
  - muscle tone
  - nerve-muscle connectivity
  - the pain continuum - acute vs chronic
  - different types of pain - neuropathic, nociceptive, idiopathic
  - the healing process - inflammation, scarring, tissue remodelling
  - neuromuscular responses to chronic conditions, including
    - diabetes
    - arthritis
    - fibromyalgia
    - chronic fatigue

    - disc degeneration
- triggers for referral or guidance from an appropriate medical or allied health professional:
    - pain upon presentation to initial session/induction
    - history of uncontrolled or unresolved pain
    - pain during movement or exercise
    - static postural deviations and an inability to correct static or dynamic posture
    - restricted joint range of movement, strength imbalance or balance, stability or coordination concern that is limiting function
    - a diagnosed muscle, bone or joint problem with medical or allied health professional advice that the problem could be made worse with physical activity/exercise
    - identified by industry endorsed pre-exercise screening and risk stratification processes
- accepted exercise technique standards
- impact of ageing and inactivity on musculoskeletal tissue, physiology and neuromuscular function relevant to exercise capacity and activities of daily living:
    - musculoskeletal tissue
    - physiology
    - neuromuscular function
    - body systems
    - aerobic and strength related effects
    - exercise capacity
    - activities of daily living
    - VO2
    - mitochondrial changes
    - blood pressure response
    - sarcopenia
    - reduction in muscle force/power
    - metabolic rate
    - glucose regulation
    - thermoregulation
    - bone density
    - nerve-muscle connections
    - hormone regulation
- physiological demands on body systems and exercise performance from:
    - smoking
    - excess alcohol consumption
    - stress
    - lack of sleep
    - dietary choices and eating patterns
    - sedentary lifestyle.

Assessment Conditions

Skills must be demonstrated in:

- a fitness industry workplace or simulated environment that offers a variety of fitness services and facilities for clients.

Assessment must ensure access to:

- information and resources relating to anatomy and physiology of the musculoskeletal, neuromuscular, cardiorespiratory and endocrine systems to support delivery of functional, effective and safe exercise programs
- anatomical models or images.

Assessment must ensure use of:

- planning and evaluation templates with space to identify improvements to professional practice
- fitness industry standard equipment and methods suitable for monitoring intensity of client sessions
- clients for the purposes of explanation and demonstration in instruction; these can be:
  - clients in the workplace, or
  - individuals who participate in project activities, role plays or simulated activities, set up for the purpose of assessment, within a training organisation.

Assessment activities that allow the individual to:

- demonstrate ability to incorporate body system knowledge into the instruction of sessions, catering for:
  - beginners, intermediate and advanced participants
  - low and high impact.

Assessors must satisfy the Standards for Registered Training Organisation's requirements for assessors, and:

- have achieved a Diploma of Fitness or above; and
- have at least 2 years consecutive post qualification fitness industry experience in the application of the skills and knowledge of the Diploma of Fitness.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1ca50016-24d2-4161-a044-d3faa200268b