USP53M
Principles of exercise, fitness and health

Unit reference number: D/507/5601
Level: 2
Guided Learning (GL) hours: 35

Overview
This unit provides learners with the knowledge and understanding of the effects of exercise on the body. Learners will develop their knowledge of the different components of fitness and the principles and variables used to progress and regress exercise and physical activity programmes for fitness and health gains. Learners will develop their knowledge of the different methods for monitoring exercising intensity and their knowledge of contra-indications and key safety guidelines for working with special populations. Learners will also develop their knowledge of the importance of healthy eating in relation to exercise and physical activity.

Learning outcomes
On completion of this unit, learners will:

LO1 Know the components of fitness
LO2 Know the health benefits of physical activity
LO3 Know the effects of exercise on the body
LO4 Know how to apply the principles and variables of fitness to an exercise programme
LO5 Know exercise contra-indications and the key exercise guidelines for special population groups
LO6 Know how to safely monitor exercise intensity
LO7 Know the importance of healthy eating
Assessment requirements

Learners must complete both assessment requirements related to this unit:

1. External examination
2. Graded synoptic assessment

1. External examination

The theory content of LO1 – LO7 will be tested by an external examination at the end of the period of learning.

External examinations will test knowledge and understanding from across the whole vocational area (mandatory units). Learners should use the unit content section of this unit to aid revision since exam questions will test the full breadth of this section.

External examinations will be set and marked by VTCT and will contribute to the overall qualification grade.

2. Graded synoptic assessment

In the last term or final third of their qualification, learners will be required to undertake a graded synoptic assessment. This will require learners to carry out a range of activities from across the whole vocational area (mandatory units). Assessment coverage will vary year on year, although all activities will be covered over time.

VTCT will set a brief for centres which will detail the activities to be covered in the graded synoptic assessment. Grading descriptors for the synoptic assessment will also be provided by VTCT.

The graded synoptic assessment will be marked and graded by centre staff and externally verified by VTCT.

The graded synoptic assessment will contribute to the overall qualification grade.
Unit content

LO1 Know the components of fitness

Learners must know what is meant by the terms physical activity, exercise and fitness:

- Physical activity – any movement of the body that increases energy expenditure above resting levels. Not being physically inactive/sedentary for extended periods of time
  - Examples – everyday activities, e.g. gardening or vigorous housework, playing games, dancing

- Exercise – activities that are planned, structured and performed regularly with the specific intention of maintaining or improving one or more of the components of physical fitness
  - Examples – walking, swimming (cardiovascular fitness), weight training, body weight exercises (muscular fitness), stretching, yoga, Pilates (flexibility, core stability and balance), sports or sports training sessions

- Fitness – a result or outcome from taking part in regular exercise
  - Health-related – cardiovascular, muscular fitness (strength and endurance), flexibility
  - Skill-related – agility, balance, power, speed, reaction time, co-ordination

Learners must know what is meant by the term health:

- Health – ‘a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’ (World Health Organisation. 1948)

- Components of total fitness
  - Physical (the body systems) – heart, lungs, muscles, bones and joints
  - Nutritional (diet and healthy eating) – eating a healthy and balanced diet containing all main nutrients, maintaining a healthy body weight and body composition, having access to healthy food
  - Medical – absence of any diagnosed chronic health condition, disease, illness or injury
  - Mental and emotional (the mind and emotions) – positive mind-set, balanced emotions, harmony between the mind and emotions, ability to cope and manage stress and stressful situations
  - Social – maintaining positive relationships and connections with others at work, home, community and society, inclusion and equality, rather than isolation and exclusion

Learners must know the components of health-related physical fitness, the benefits of training each component and types of exercise and activity to improve each component:

- Cardiovascular
  - Definition – efficiency of the heart, lungs and circulatory system to take in, transport and utilise oxygen and remove waste products
  - Types of exercise – activities that involve rhythmic use of large muscle groups, moderate or vigorous intensity
  - Examples – swimming, cycling, walking, running, stair climbing, use of cardiovascular machines, group exercise, indoor cycling
  - Benefits – improved cardiovascular health and reduced risk of associated cardiovascular diseases, improved body composition
  - Risks – impact and/or overuse injuries, over-training
- Training guidelines – 3 – 5 days a week, moderate to vigorous intensity, 20 – 30 minutes or up 60 minutes of continuous or intermittent activity
  - Moderate – 30 minutes, which can be accumulated in bouts of 10 minutes or more
  - Vigorous – 20 minutes sustained (See ACSM guidelines)

- Muscular fitness
  - Definition – muscular strength – ability of a muscle or group of muscles to generate maximal force or overcome a maximal resistance, e.g. 1 repetition maximum (RM) to 10 repetition maximum (RM)
  - Definition – muscular endurance – ability of a muscle or group of muscles to contract repeatedly for an extended duration without fatigue, e.g. working with lower resistances 40 – 70% of 1RM
  - Types of exercise – resistance machines, body weight exercises, free weights, water resistance, cable machines, portable resistance training equipment, elastic resistance, cable machines
  - Examples – gym-based training, studio resistance training, body conditioning classes, core stability, yoga, Pilates
  - Benefits – improved posture, improved muscle tone and physical shape, improved body composition, improved joint stability
  - Risks – overuse injuries, muscle imbalance, incorrect exercise technique and alignment
  - Training guidelines – 2 – 3 days a week for same muscle groups on non-consecutive days (See ACSM guidelines)
    - Resistance or % of one repetition maximum (1RM) – 40 – 50% for older or sedentary adults, 60 – 70% for beginners, > 80% for experienced
    - Repetitions 8 – 12 repetitions for muscular fitness (10 – 15 repetitions for beginners or 15 – 20 repetitions for endurance)
    - Sets and rests – single sets effective for beginners or older adults. 2 – 4 sets for adults. < 2 sets is for endurance. Intervals or 2 – 3 minutes between sets

- Flexibility
  - Definition – the ability of a joint and associated muscles to move through the full potential range of motion
  - Types of stretching – active and passive static, dynamic, ballistic, proprioceptive neuromuscular facilitation, e.g. contract-relax (CR) and contract-relax-antagonist-contract (CRAC)
  - Benefits – improved range of motion, improved posture, reduced risk of injury, improved functional ability, injury rehabilitation, reduced muscle stiffness/cramps
  - Risks – incorrect technique leading to misalignment and joint strain/sprain, exceeding range of motion and overstretching, injury to muscles and tendons, injury to ligaments and joint capsules
  - Training guidelines – at least 2 – 3 days a week, ideally every day. Stretch to the point of mild discomfort. Static stretches 10 – 30 seconds. 2 – 4 repetitions of specific muscle stretches. PNF – static contraction for 3 – 6 seconds followed by 10 – 30 second static stretch (See ACSM guidelines)
Learners must know the components of skill-related physical fitness, the benefits of training each component and types of exercise and activity to improve each component:

- Components of skill-related or motor fitness – speed, reaction time, agility, balance, coordination, power
- Benefits – skills related to specific sporting activities, e.g. power (strength and speed) required for throwing and jumping events, speed required for track events, coordination and balance required for gymnastics, reaction time required for boxing and leaving blocks in sprint races
- Training guidelines – give consideration to guidelines for other fitness components trained, e.g. for power see strength/endurance considerations in relation to frequency of training and allow sufficient rest and recovery

Learners must know the different factors that can affect fitness and health:

- Genetics and heredity – muscle fibre composition, body type
- Gender, age, height, weight, lever length
- Training status and experience – inactive and sedentary, active work and travel, regular exerciser, previously active (concept of muscle memory)
- Lifestyle factors – nutrition, smoking, alcohol, drugs, work, rest, stress, weather
- Health inequalities – socio-economic status, low income, low education, ethnicity
LO2 Know the health benefits of physical activity

Learners must know the current guidelines and recommendations (ACSM and Department of Health) for physical activity to maintain health for adults:
- 150 minutes of moderate-intensity aerobic activity every week, e.g. 5 days for 30 minutes (time can be accumulated in bouts of ten minutes or more)
- Or 75 minutes of vigorous-intensity activities (at least 20 minutes, 3 days a week)
- Or an equivalent combination of moderate-intensity activities and vigorous-intensity activities
- Plus 2 days a week muscular fitness training (ACSM, 2014. DH, 2011)

Learners must know the health benefits associated with regular physical activity:
- Reduced early mortality, reduced morbidity from coronary heart disease, stroke, diabetes, certain cancers
- Improved mental health and psychological wellbeing, reduced risk of anxiety, stress and depression
- Improved weight management and body composition, reduced risk of obesity
- Improved posture, prevention of lower back pain, reduced risk of injury, improved joint stability
- Increased bone density, reduced risk of osteoporosis
- Improved quality of life, improved independence, reduced risk of falls (older adults)
- Improved ability to perform active daily living tasks, improved functional capacity

Learners must know the effect of physical activity on the causes of diseases and chronic health conditions:
- Coronary heart disease – reduced blood pressure, improved blood cholesterol profile, improved elasticity of blood vessels, capillarisation, improved blood flow distribution
- Some cancers – increased physical activity is associated with reduced risk of colon cancer, other healthier lifestyle choices, and reduced stress that may be contributory factors for some other cancers
- Type 2 diabetes – improved regulation of insulin, improved blood glucose regulation
- Hypertension – reduced blood pressure post-exercise and long-term, improved blood flow distribution, improved elasticity of blood vessels, reduced muscular tension, reduced stress level
- Obesity – improved fat metabolism, increased calorie expenditure
- Osteoporosis – increased bone formation, improved density, improved posture, reduced risk of injury
- Mental health – improved mood, increased dopamine, endorphins, increased feel-good factor and sense of well-being
LO3 Know the effects of exercise on the body

Learners must know how the body responds and adapts to different types of exercise to enable them to prescribe appropriate exercise programmes:

Cardiovascular and respiratory system responses and adaptations

- Cardiac – improved oxygen transport, increased heart size, increased stroke volume, decreased resting heart rate, increased cardiac output, improved blood flow distribution
- Respiratory – improved pulmonary ventilation, improved pulmonary diffusion, arterial-venous oxygen difference, decreased resting breathing rate, increased lung capacity, improved strength and endurance of respiratory muscles
- Vascular – increased blood volume, capillarisation, reduced peripheral resistance
  - Exercise response – no change in diastolic blood pressure, progressive increase in systolic blood pressure
  - Immediate post-exercise effects – reduced resting blood pressure for up to 24 hours
  - Long term effects – reduction in overall resting blood pressure, improved regulation of overall blood pressure
- Blood pooling – pooling of blood in the extremities (lower limbs)
  - Caused by reduced venous return following exercise relative to cardiac output (skeletal muscle pump, non-return valves)
  - Associated risks (dizziness, fainting)
  - Prevention of blood pooling through progressive cool down to maintain haemostasis
- Exercise types (see cardiovascular fitness LO1)

Skeletal system responses and adaptations

- Improved bone density, increased joint stability, improved mobilisation and range of motion at joints
- Significance of weight-bearing exercise – improved bone density and reduced risk of osteoporosis
- Types of weight-bearing exercise – walking, running, resistance training
- Potential increase in risk of osteoarthritis from repetitive loading of joints
- Exercise types (see muscular fitness LO1)

Energy systems

- Long term effects of aerobic exercise, increased concentration of aerobic enzymes, increased size and number of mitochondria, increased ability to use fat as an energy source, increased storage of muscle glycogen
- Long term effects of lactate threshold training (intervals) include improved tolerance and clearance/buffering of acidosis
- Long term effects of phosphocreatine system training (maximal effort, sprints, explosive lifting, jumping) include increased levels of phosphocreatine and free creatine within muscles
- Exercise types (see cardiovascular fitness LO1)
Neuromuscular system responses and adaptations
• Short term – increased contractility, increased excitability, increased elasticity, increased energy metabolism, heat generation

Delayed onset of muscle soreness (DOMS)
• Structural muscle damage (microscopic fibre tears, muscle cell leakage), effects of eccentric muscle contractions
• Causal exercises and techniques (e.g. new or unaccustomed training techniques, increased training volume or intensity, plyometrics, eccentric resistance training, downhill running)
• Long term muscular endurance training – increase in cross-sectional area of type 1 fibres, atrophy of type 2 fibres, reduced total muscle mass, increase size and number of mitochondria, increased numbers of capillaries and capillary density
• Long term hypertrophy training – increase in muscle mass and cross-sectional area of type 1 and 2 fibres, increased motor unit recruitment, potentially an increased size and number of mitochondria, reduced capillary density
• Long term strength training – increased co-ordination / synchronicity of muscle firing, hypertrophy of all muscle fibre types
• Exercise types (see muscular fitness, motor fitness and flexibility LO1)
LO4 Know how to apply the principles and variables of fitness to an exercise programme

Learners must know the principles and variables of training to progress and regress exercises and activities:

Definitions and associated physiological implications of each principle:

- **Specificity** – the SAID principle (Specific Adaptation to Imposed Demand). The body adapts to the specific training demands placed on it, e.g. stretching increases flexibility but will not affect cardiovascular fitness. The adaptations from running training will not improve swimming performance, Lat pull down exercise training will not transfer to improved pull-up performance.

- **Progressive overload** – for adaptation to occur the body will have to work harder than it is accustomed to. Progressive overload can be achieved by increasing the volume of work (frequency, intensity, time, type) and balancing rest and recovery time. General adaptation syndrome.

- **Reversibility** – the ‘use it or lose it principle’. Improvements will only be maintained if activity is continued. If training ceases, the benefits gained will be lost through gradual decline. The training volume required to maintain a fitness component is lower than that which was required to improve it.

- **Adaptability** – the body adapts physiologically to the specific type of challenge and overload.

- **Individuality** – individual factors that will affect training potential include: age, gender, heredity (genetics), body type, and physiological differences such as current flexibility, motor skills or strength.

- **Recovery time** – rest and recovery time are essential to prevent overtraining. Physiological adaptations occur during rest and recovery periods. Fatigue, recovery/compensation, super compensation and involution.

- **FITT principles**
  - Frequency – how often or the number of times per week the activity will be performed.
  - Intensity – how hard the activities will be in a single session, %1RM, %HRmax.
  - Time or duration – how long the activities will be performed for, minutes, number of repetitions x sets x exercises.
  - Type – the specific activities that will be performed, e.g. walking, swimming, strength, endurance, Pilates.

- **Programme variables**
  - Repetitions.
  - Rate or speed.
  - Range of motion.
  - Resistance (including gravity, body weight and external resistance).
  - Rest.

NB: For American College of Sports Medicine (ACSM) standard guidelines and application to different components of fitness see LO1.
Learners must know the key considerations for progressing or regressing a training programme:

- Client training needs analysis
  - Reasons for progression – progressive overload, challenge, physiological adaption, to improve specific fitness components, training for an event
  - Reasons for regression – overtraining, inadequate recovery, over participation in competition, repetitive and boring training, consistent, high intensity, high levels of non-training stress
  - Recognising signs and symptoms of overtraining – condition and performance, psychological, movement co-ordination
  - Guidelines for prevention and recovery of overtraining, importance of rest and recovery. Use of periodisation to plan progressive programmes

- Consideration to relevant principles and variables
- Application of SMART goal setting (Specific, Measurable, Achievable, Realistic and Relevant, Time-bound)

Learners must know the effects of speed, levers, gravity and resistance on exercise safety and effectiveness:

- Speed
  - Slower exercise speed enables stricter posture and more accurate alignment, muscle undergoing contraction for longer may increase time under tension and effort of resistance exercises (e.g. longer time spent on concentric or eccentric phase of movement, longer time holding a position increases work of fixator muscles)
  - Faster exercise speed increases potential for injury risk, increases potential for improper posture and alignment, increase of intensity related to increase in heart rate and demand on energy systems (anaerobic)

- Levers – lever length will affect speed of movement, force generation (intensity), range of motion, torque loads

- Gravity – will affect speed and control of eccentric movements, power generation, working across gravity will reduce intensity/resistance for some muscular fitness exercises, gravity will assist some stretch positions, water-based exercise modalities decrease effects of gravity on movement (reduce weight-bearing)

- Resistance – increased resistance will increase exercise intensity and reduce speed of movement

Learners must know the key differences when programming for gains in fitness of health:

- See training guidelines for components of fitness (LO1)
- See training guidelines for health (LO2)
LO5 Know the exercise contra-indications and key safety guidelines for special population groups

**Learners must know exercise contra-indications and safety guidelines for older adults (50+):**
- Definition of older adults (ACSM. 2014)
  - Aged 65 and over
  - Aged 50 – 64 with chronic health conditions or physical limitations
- Considerations – only 1% of the 50+ population is highly trained, activity levels are low and decline with age, 1 – 2% loss in physical components of fitness each year. Effects of ageing process on anatomical and physiological systems must also be considered
- Contra-indications – resting blood pressure 180/90, resting heart rate 90bpm, multiple CVD risk factors, combinations of symptoms of other chronic health conditions also contraindicated, risk of falls, poor functional status
- Safe exercise guidelines – pre-exercise health screening, refer to other professionals if required, undertake longer and more gradual mobility and warm-up, undertake a gradually tapered cool down, exercise intensity must be at a challenging but health-related level, use RPE scale to monitor intensity, emphasise correct exercise technique, increase duration of transitions, simplify exercise when required, learn new exercises at the most basic level, avoid extreme spinal flexion

**Learners must know exercise contraindications and safety guidelines for antenatal and postnatal women:**
- Definition of ante-natal and post-natal
  - Ante-natal – three trimesters
  - Post-natal – post-birth period
- Considerations – guidelines apply to normal and healthy adult women, normal and healthy pregnancy, normal and healthy birth, previously normal and healthy pregnancies and births. Anatomical and physiological changes during pregnancy should also be considered in relation to each trimester
- Contra-indications – refer to ACSM relative and absolute contraindications
  - Relative include – severe anaemia, poorly controlled type 1 diabetes, orthopaedic limitations, heavy smoker
  - Absolute include – pre-eclampsia, premature labour during current pregnancy, placenta praevia after 26 week gestation
- Safety guidelines – screening tool (PARmed-X for pregnancy), non-exercisers should begin with 15 minutes continuous aerobic activity gradually increasing to 30 minutes, not exceed 45 minutes duration, maintain adequate hydration and calorie intake, avoid exercising in hot and humid conditions, use the RPE scale to monitor intensity not heart rate, avoid supine exercise after 16 weeks of pregnancy, avoid prone exercise, avoid prolonged motionless standing, avoid heavy isometric exercise, avoid leg adduction and abduction against resistance, avoid loaded forward flexion, avoid rapid changes of direction, avoid uncontrolled twisting or ballistic movements, avoid risk of falling or trauma, avoid high intensity or impact exercise, re-educate post-natal women on posture and joint alignment before progressing, avoid crunching and twisting abdominal exercises, babies should be excluded from the exercise area, ensure instructor’s first aid skills are up-to-date, follow exercise guidelines for trimesters of pregnancy
Learners must know exercise contraindications and safety guidelines for young people (aged 14 – 16):

- Definition – young people aged 14 – 16 who are apparently healthy can participate
- Considerations – pre-screening to check health status. Individuals with medical conditions, including obesity require specialist interventions
- Contra-indications – stage of growth and development, musculoskeletal injuries (growth plates)
- Safety guidelines – wear appropriate clothing and footwear, undertake a gradual warm up and cool down, avoid heavy resistance exercises, use RPE to monitor exercise intensity, resistance training should use lighter weights and higher reps, emphasise correct exercise technique, avoid ballistic stretching, ensure adequate hydration and calorie intake

Learners must know exercise contraindications and safety guidelines for disabled people:

- Definition – World Health Organisation (WHO) define disability as – ‘an umbrella term covering impairments, activity limitations and participation restrictions’
- Physical and medical conditions with disabling symptoms include
  - Sensory – deafness, partially hearing, blind, partially sighted
  - Cognitive – Down’s syndrome
  - Medical – cancer, fibromyalgia, stroke, obesity, arthritic conditions, HIV/Aids
  - Mental – severe depression, post-traumatic stress disorder
  - Physical – limb amputation, cerebral palsy
- Contra-indications – impaired physical condition and function, impaired motor skills, impaired neurological or cognitive function, impaired sensory function, musculoskeletal imbalances and postural deviations
- Safety guidelines – medical screening and referral prior to participation, refer to other professionals if required, consideration to equality and inclusion legislation, undertake exercise in a safe and supportive environment, make reasonable adjustments to enable access, adapt exercise for the specific disability, provide specialist assistance if required, incorporate functional and life related movement, use specialist equipment if required
LO6 Know how to safely monitor exercise intensity

Learners must know the different methods of monitoring exercise intensity and the limitations and benefits of using each method when working with clients:

Rating of perceived exertion (RPE)
- Description – visual scales against which the client describes how they perceive overall exercise intensity. Two scales devised by Gunner Borg
  - Original – 6 to 20, reflects heart rates ranging from 60 – 200 bpm
  - Modified category ratio 10 scale (CR10), 0 to 10*, more familiar and user-friendly to rate numerically
- Benefits – visual scales using the verbal descriptions of exertion should be used to provide an accurate estimate of intensity, useful when heart rate monitoring cannot be used, e.g. client on beta blocker/ACE inhibitor medication or heart rate monitors do not fit
- Limitations – needs to be explained, takes practice for individuals to become proficient. Effort perceived is subjective and individuals may misrepresent

Heart rate monitoring
- Description – measuring the rate at which the heart beats to determine intensity. There are two methods
  - Heart rate monitor
  - Manual pulse taking (radial artery of wrist, carotid artery of neck)
- Calculations
  - A rough estimate of maximal heart rate with minimal calculation is the calculation
    \[ \text{MHR} = 220 - \text{age} \]
  - More accurate estimates of age predicted maximal heart rate can be calculated using the formula developed by Gellish et al.
    \[ \text{MHR} = 207 - (0.7 \times \text{age}) \]
  - Target heart rates (THR) can be determined based on a model of training zones 50 – 60% moderate aerobic zone, 60 – 70% aerobic weight management zone, 70 – 80% aerobic fitness improvement zone, 80 – 90% peak performance zone. Guidelines have moved away from a threshold-based model but target zones can still be useful for clients
    - ACSM (2014) intensity guidelines:
      - Moderate intensity – 50 – 65% of MHR
      - Vigorous intensity – 65 – 90% of MHR
- Benefits – use of a heart rate monitor provides an accurate, objective measurement of the body’s response to exercise
- Limitations – age-adjusted MHR is an estimate and actual MHR may be up to 11bpm higher or lower. Manual pulse taking is less accurate, monitors can be expensive, calculations required

Observation:
- Indicators – facial expressions, skin colouring (pallor around the lips may represent reduced oxygen), posture, alignment, exercise technique, coordination, sweating
- Benefit – easy to use, immediate assessment
- Limitations – general indicators, no research-based validity
Talk test

- Description – field test for determining ventilatory thresholds. Protocols evaluate the client’s ability to repeat a passage of text during exercise
  - Light activity – talking easily, breathing lightly, heart rate increased
  - Moderate activity – talking comfortably, breathing deeper and quicker, body feels warmer
  - Vigorous activity – talking more difficult, breathing heavier and deeper, shortness of breath, unable to repeat passage without hesitation
- Advantages – simple and easy, doesn’t require any specialist equipment or specific skills to be taught
- Limitations – subjective interpretation by tester and less accurate than other methods
LO7 Know the importance of healthy eating

Learners must know where to find information on current national guidelines for healthy eating:

- National Food Guide, Food Standards Agency (FSA), eatwell guide (balance of good health), Government Department of Health (DoH) ‘five a day’ fruit and vegetable recommendation

- General principles of a healthy balanced diet

Learners must know the importance of adequate hydration:

- Types of fluid/drinks. Water (preferred source)
- Intake quantity, timing of intake – depending on activity levels, temperature
- Importance – maintain body balance/homeostasis, maintain body processes and functions, physical and mental performance, thermoregulation, blood plasma volume, removal of waste products

Learners must know their professional role boundaries with regard to providing nutritional advice:

- Role boundaries – provide general healthy eating advice to healthy adults, evidence-based information that is available from recognised sources, e.g. FSA, DoH, British Dietetic Association (BDA)
- Sources for information on boundaries – Code of Ethics, REPs Code of Conduct, British Dietetic Association
- When to refer to GP or healthcare professionals (registered dietitian, registered nutritionist) – chronic health conditions (e.g. severe obesity, diabetes, allergies, coeliac, heart disease) malnutrition including vitamin and mineral deficiencies, excessively underweight, eating disorders, requests for specific meal plans or advice on dietary supplements

Learners must know the dietary role and sources of the key nutrients:

- Types of nutrient
  - Macronutrients – carbohydrates (sugars, starches, fibres), lipids (fats and oils, cholesterol), proteins (complete and incomplete)
  - Micronutrients – vitamins, minerals and water

Macronutrients:

- Carbohydrates
  - Role – energy, digestion (fibre), nervous system function
  - Sources
    - Simple carbohydrates – sugar, sweets, chocolate, fruit
    - Complex carbohydrates – beans, bread, pasta, potatoes, rice, corn

- Fats
  - Role – provide essential fatty acids, insulation, protection of vital organs, energy, transport fat-soluble vitamins
  - Sources
    - Saturated – animal/dairy products, meat, fish, eggs, dairy products
    - Unsaturated – Fish oils, nuts, seeds, fruit (olives, avocado), plant oils, grains, beans and pulses
    - Hydrogenated/trans – processed food products e.g. confectionery, cakes, biscuits, bread, boxed cereals
- **Protein**
  - Role – muscle growth, muscle repair, oxygen transport, fight disease, energy
  - Sources
    - Animal (all amino acids) – animal/dairy products, meat, fish, eggs, dairy products
    - Plant (not all amino acids) – grains, beans and pulses, leafy vegetables

**Micronutrients:**
- **Vitamins** – water soluble (C and B group), fat soluble (A, D, E and K)
  - Roles – energy metabolism, protein synthesis, glycogen synthesis, blood clotting, red blood cell formation, aid growth, maintenance of teeth and bones, aid vision
  - Sources – all natural food sources, e.g. vegetables, fruit, milk, fish, eggs
- **Minerals** – macro and trace e.g. calcium, copper, iron, magnesium, phosphorus, potassium, sodium, selenium, zinc
  - Roles – bone growth, teeth growth, energy production, enzyme function, nerve and muscle function, water balance, blood clotting, oxygen transport in red blood cells
  - Sources – all natural food sources, e.g. milk, nuts, seeds, vegetables, meats, grains

**Learners must know the role of the energy balance equation in relation to weight management:**
- The two components of the energy equation
  - Energy intake – food and drink, the type and amount of food eaten, type and amount of drinks consumed that contain energy i.e. all macronutrients and alcohol
  - Energy expenditure – relative expenditure of energy, basal / resting metabolic rate (BMR/RMR), movement (physical activity and exercise), thermic effect of food
- Energy balance equation
  - Energy in and out balanced = maintain weight
  - Energy in exceeds energy out = weight gain
  - Energy out exceeds energy in = weight loss
- Other considerations – influence of individual differences on energy expenditure e.g. genetics, hormone balance, energy needs for different activities, fitness levels, movement efficiency

**Learners must know the health risks associated with poor nutrition and unhealthy eating:**
- Chronic diseases associated with poor nutrition e.g. obesity, type 2 diabetes, heart disease, stroke, osteoporosis, cancer, atherosclerosis, hypertension, arthritis, mental health problems (depression, anxiety)
- Acute conditions associated with nutritional deficiencies e.g. anaemia, dehydration, hypoglycaemia
Resources

The resources for this unit must support learners to develop their knowledge of exercise, fitness and health and apply this to their own and others activity and fitness training practices.

Best practice should be encouraged by giving learners the opportunity to access current research and guidelines that inform exercise science (e.g. NICE, ACSM, BASES, BHFNC, Department of Health).

Recommended text books:


NB: This list is not exhaustive. There are many other valuable text books.

Government reports and white papers:


Recommended websites:
- National Institute for Health and Care Excellence (NICE) – www.nice.org.uk
- American College of Sport Medicine (ACSM) – www.acsm.org
- Department of health – www.gov.uk/government/organisations/department-of-health
- British Association of Sport and Exercise Science – www.bases.org.uk
- British Heart Foundation National Centre – www.bhfactive.org
Delivery guidance

Teachers are encouraged to use innovative, practical and engaging delivery methods to enhance the learning experience. Learners may benefit from the use of:

- Interactive information and technology systems and software so they can actively learn about different fitness concepts and theories and nutritional and healthy guidelines.

- A variety of practical activity and exercise sessions to experience diverse training modalities used to improve different components of fitness, including examples of activity sessions for special populations. DVDs can also be used to observe different types of sessions.

- Interactive workshops that enable application of knowledge in a practical context, e.g. progression and adaptation workshops, flexibility exercise workshops, heart rate monitoring workshops.

- Presentations and forums using guest speakers, e.g. dietitian, public health representatives, instructors who work with special populations.
Links with other units

This unit is closely linked with the following units:

**USP51M Anatomy and physiology for exercise and health**
Learners will be required to apply their knowledge of anatomy and physiology when learning about the principles of exercise and fitness and health. The content of the anatomy and physiology unit can be integrated with principles of exercise, fitness and health unit to ensure learning is contextualised to exercise and fitness.

**USP52M Health, safety and welfare in a fitness environment**
Learners will require some knowledge of health and safety to enable them to prepare the environment and participate in physical activities included as part of the principles of exercise, fitness and health unit. Some content of the content of the health and safety unit (risk assessment) should be delivered before delivery of the principles of exercise, fitness and health unit.

**USP54M Planning gym-based exercise**
Learners will be required to apply their knowledge of the principles of exercise, fitness and health when planning and preparing for gym-based exercise sessions in a real or realistic working environment. The content of the principles unit should be delivered before delivery of the planning gym-based exercise unit.

**USP55M Instructing gym-based exercise**
Learners will be required to apply their knowledge of the principles of exercise, fitness and health when providing gym-based exercise sessions in a real or realistic working environment. The content of the principles unit should be delivered before delivery of the gym-based exercise unit.

**USP56M Programming personal training with clients**
Learners will be required to apply their knowledge of the principles of exercise, fitness and health when programming personal training with clients in a real or realistic working environment. The content of the principles unit should be delivered before delivery of the programming personal training unit.

**USP57M Delivering personal training sessions**
Learners will be required to apply their knowledge of the principles of exercise, fitness and health when delivering personal training sessions in a real or realistic working environment. The content of the principles unit should be delivered before delivery of the delivering personal training unit.

**Graded synoptic assessment**
At the end of the qualification of which this unit forms part, there will be a graded synoptic assessment which will assess the learner’s ability to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories and knowledge from a number of units from within the qualification. It is therefore necessary and important that units are delivered and assessed together and synoptically to prepare learners suitably for their final graded assessment.