Unit title	Exercise Physiology
Unit level	Three
Unit credit value	6
Unit code	WNI838
Unit type	Academic Subject Content
Unit review date	31/12/2028
Graded/ungraded	Graded

This unit has 4 learning outcomes:

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The learner will:	**The learner can:**
1. Understand the different energy systems.	1.1 Describe the three different energy systems. 1.2 Describe the recover process for the three energy systems. 1.3 Identify different types of activity on the energy continuum.
2. Understand how the cardiovascular and respiratory system responds to exercise.	2.1 Describe the initial responses of the cardiovascular and respiratory systems to exercise. 2.2 Explain how the cardiovascular and respiratory systems respond to steady-state exercise. 2.3 Explain how the cardiovascular and respiratory systems adapt to long-term exercise.
3. Understand how the neuromuscular and energy systems respond to exercise.	3.1 Describe the initial responses neuromuscular and energy system to exercise. 3.2 Explain how the neuromuscular and energy systems respond to steady state exercise.

	3.3 Explain how the neuromuscular, energy and skeletal systems adapt to long-term exercise.
4. Understand fatigue and how the body recovers from exercise.	4.1 Describe fatigue, and how the body recovers from exercise.

Assessment (Graded)

1. Meets assessment criteria	At least a Pass
2. Further grading	
▪ Meets assessment criteria but not merit grading standards	Pass
▪ Meets assessment criteria and merit but not distinction grading standards	Merit
▪ Meets assessment criteria and distinction grading standards	Distinction

Indicative content

The following content is to be included in the delivery of the unit.

Learning outcomes	Indicative content
1. Energy Systems	• phosphocreatine • lactic acid system • aerobic energy system • amount of ATP produced by each system • sports that use these systems to provide energy • recovery time
1&2 Initial Responses	• **Exercise:** anaerobic/aerobic • **Cardiovascular responses:** heart rate (anticipatory increase and activity response); stroke volume; cardiac output; blood pressure (calculating – resistance to flow multiplied by heart rate; readings)

	• **Respiratory responses:** increase in breathing rate; intercostal muscles; increase in tidal volume; Valsalva manoeuvre; pulmonary ventilation • **Neuromuscular responses**: nervous control of muscular contraction • **Energy system responses**: adenosine triphosphate production; creatine phosphate and lactic acid system; anaerobic glycolysis
1&2 Stay state Exercise Responses	**Steady-state exercise**: eg 20 minutes of continuous same-speed jogging, 20 minutes of an aerobics class, cycling a constant speed on flat terrain for 20 minutes. **Cardiovascular responses:** heart rate; stroke volume; cardiac output; blood flow (vasodilatation and vasoconstriction); blood pressure; thermoregulation; increased venous return; Starling's law Respiratory responses: tidal volume; breathing rate; effects of pH and temperature on the oxygen dissociation curve **Neuromuscular responses**: increased pliability of muscles; increased transmission rate of nerve impulses **Energy system responses:** adenosine triphosphate production; aerobic energy system; anaerobic glycolysis; mitochondria; Krebs cycle; electron transport chain
1. Long term Effects of Exercise	**Long-term exercise**: eg four 30-minute jogging sessions per week for eight weeks, a six-week training programme **Cardiovascular adaptations**: cardiac hypertrophy; increase in stroke volume; increase in cardiac output; decrease in resting heart rate; blood volume; capillarization **Respiratory adaptations**: increase in minute ventilation; efficiency of respiratory muscles; increase in resting lung volumes; increase in oxygen diffusion rate **Neuromuscular adaptations**: hypertrophy; increase in tendon strength; increased myoglobin stores; increased numbers of mitochondria; increased storage of glycogen and triglycerides; neural pathways

	Skeletal adaptations: increased calcium stores; increased tendon strength; increased stretch of ligaments **Energy system adaptations:** increased anaerobic and aerobic enzymes; increased use of fats as an energy source; higher tolerance to lactic acid

1. Fatigue	**Fatigue:**
	• Define Fatigue in the context of exercise
	• Factors contributing to fatigue, such as metabolic, neuromuscular, and psychological factors.
	  ○ Depletion of energy sources, eg creatine phosphate, muscle and liver glycogen; effects of waste products, eg blood lactate accumulation, carbon dioxide, increased acidity;
	  ○ neuromuscular fatigue, eg depletion of acetylcholine, reduced calcium-ion release
	Recovery:
	• Excess post exercise oxygen consumption (EPOC)
	• fast components, eg restoration of muscle phosphagen stores, removal of lactic acid
	• slow components, eg replenishment of myoglobin stores, replacement of glycogen

Indicative content

The following content is to be included in the assessment of the unit.

Learning outcomes	Indicative content
1. Understand the different energy systems	Learners must describe the different energy systems and their use in sport and exercise activities. All energy systems in the indictive content must be covered. For each energy system learners must include: • the fuels used • the amount of adenosine triphosphate (ATP) produced • by-products and recovery time. Learners must also describe how the energy systems work together to provide a continuous supply of energy during exercise.

2. Understand how the cardiovascular and respiratory systems respond to exercise	Learners must describe what happens to the cardiovascular and respiratory, during the first few minutes of exercise and why it happens. Learners must explain what happens to the cardiovascular and respiratory, systems after 20 minutes of continuous exercise and why these changes occur. Learners must explain how the cardiovascular system and respiratory systems adapt to long term exercise; the exercise period explored should be no less than eight weeks.
3. Understand how the neuromuscular and energy systems respond to exercise	Learners must describe what happens to the neuromuscular and energy systems the first few minutes of exercise and why it happens. Learners must explain what happens to the neuromuscular and energy systems after 20 minutes of continuous exercise and why these changes occur Learners must explain how the neuromuscular and energy systems adapt to long term exercise; the exercise period explored should be no less than eight weeks.
4. Understand Fatigue and how the body recovers from exercise	Learners must be able to define fatigue and the factors contributing to fatigue. learners must describe the mechanisms of fatigue; this includes the effect of waste products, neuromuscular fatigue, and depletion of energy sources. Learners must be able to describe the recovery process as outlined in the Indicative content

Assessment methodology

The following assessment methods are suggested for the assessment of this unit.

- Report
- Presentation
- Academic Poster
- Assignment