The Sutton Academy

Knowledge Rich Curriculum Plan

BTEC Extended Certificate in Sport / Unit 1

Learning aim E: The effects of exercise and sports performance on the energy systems

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this students, need to already know that…*	Assessment
Lesson 1: The importance of energy in sports performance and the role of ATP	• Students will know that the methods by which your body generates energy is determined by the intensity and duration of the activity being undertaken. • Students will know that intensity means how hard you are working or how physically demanding a task is • Students will know that prolonged means to continue to perform over a longer period of time than usual • Students will know that we create energy either aerobically (with oxygen) or anaerobically (without oxygen) • Students will know how the body breaks down ATP to ADP to create energy • Students will know that ATP means adenosine Triphosphate and is the only source of energy in the body • ADP means Adenosine diphosphate and is what is left after energy has been created	Aerobic Oxygen Anaerobic Adenosine Triphosphate (ATP) Adenosine Diphosphate (ADP) Energy	• Students need to already know that energy is created in muscle cells (mitochondria) • Students need to already know that energy is obtained through the breakdown of foods in our diet - particularly carbohydrates and fats (unit 2 link)	
Lesson 2: To know the key features and process of the ATP-PC system in energy production	• Students will know that the ATP-PC system is also known as the alactic system and is anaerobic • Students will need to know that this system re-synthesises ATP for sports with sudden or powerful movements • Student will need to know that re-synthesis means to combine or produce something again • Students will need to know that this process is known as a coupled reaction which means were the energy from one reaction is used for another reaction • Students will need to know how phosphocreatine is broken down to re-synthesis 1 ATP • Students will need to know that this system can only provide energy for 8-10 seconds	Alactic system Re-synthesis Power Coupled reaction Phosphocreatine	• Students need to already know that ATP means adenosine Triphosphate and is the only source of energy in the body • Students need to already know how this process of energy production works • Students will already need to know that ATP only lasts for 2-3 seconds	
Lesson 3: To know the key features and processes of the lactate system in energy production	• Students will know that the lactate system is a short term energy system and also works anaerobically. • Students will need to know that this system re-synthesises ATP for sports that are higher intensity over longer periods such as 400m • Student will need to know that this system can produce energy for 60-90 seconds of maximal work. • Students will need to know that maximal means using a great effort	Lactate system Anaerobic Re-synthesis ATP Energy Glycogen Glycoysis Glucose	• Students need to already know that carbohydrates are stored in the body as glucose and glycogen (unit 2) • Students need to already that when exercising at a high intensity our muscles produce lactic acid which inhibits performance	

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	• Students will need to know that this process uses glycogen to create energy through a process known as anaerobic glycolysis • Students will need to know that anaerobic glycolysis means to break down glucose without the presence of oxygen • Students will need to know the process of how glucose and glycogen are broken down to re-synthesis 2 ATP • Students will need to know that a by product of this system is lactic acid. • Students will need to know that a by product means a secondary product made in the manufacture or synthesis of something else.	By-product Manufacture		
Lesson 4: To apply knowledge of the energy system to an extended response exam question			• *Students need to already know the role of ATP* • *Students already need to know the process of energy production via the ATP-PC system and the lactate system* • *Students will already need to know how long each of the above systems can provide energy for to be able to relate this knowledge to the exam question.*	
Lesson 4: To know the key features and processes of the aerobic system in energy production	• Students will need to know that the aerobic system requires oxygen to re-synthesise ATP • Students will need to know that this system re-synthesises ATP for sports that are long, continuous and modertate in intensity. • Students will need to know that there are 3 processes in the aerobic system: Aerobic glycolysis, Krebs cycle, Electron transport chain • Student will need to know that this system can produce 38 ATP and allow you to perform for long periods. • Students will need to know that the aerobic system uses fats and carbohydrates as the fuel source. These are then broken down into glycogen, glucose and fatty acids. • Student will need to know that it can take a few hours or up to 2-3 days for the aerobic system to recover after exercise.	Oxygen Re-synthesis ATP Aerobic Glycolysis Krebs Cycle Electron Transport Chain Aerobic system Fats Carbohydrates Glycogen Glucose	• Students need to already know how the body creates energy through anaerobic glycolysis • Students need to already know different types of endurance events, such as a marathon, tour de France, long distance swimmer	

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Lesson 5: To know how the energy systems work in combination	• Students will know that during exercise energy is derived from all three systems • Students will know that derive means to obtain something from (a specified source) in this case ATP • Students will need to know how to interpret energy continuum graphs and energy blocks in relation to energy contribution		• Students need to already know that the energy systems work together to create energy for exercise • Students need to already know how the energy systems re-synthesise ATP • Students will need to already know how exercise intensity can determine which energy system is used	
Lesson 6: To know how the energy systems adapt to long term exercise	• Students will know that long term exercise will allow the body's energy systems to adapt to the demands of physical activity • Students will know that the body adapts in the following ways: • Increased creatine stores • Increased tolerance to lactic acid • Increased aerobic capacity • Increased use of fats as an energy source • Increased storage of glycogen and increased number of mitochondria	Creatine Lactic Acid Tolerance Aerobic capacity Glycogen Mitochondria	• Students will need to already know what creatine is used for (ATP-PC system) • Students will already need to know what lactic acid is (Muscular system) • Students will need to know what fats and glycogen are (Unit 2)	
Lesson 7: To know the additional factors that affect the energy systems and their impact on performance	• Students will need to know that there are two additional factors that can impact the energy systems and performance in sport (diabetes / hypoglycaemic attack & children lack of a lactate system) • Students will need to know that hypoglycaemia is an abnormally low level of glucose in the body • Students will need to how how hypoglycaemia and diabetes can affect performance and what the key symptoms are • Students will need to know how a childs lack of lactate system can impact performance	Hypoglycaemic Lacate system Glucose Diabetes	•	
Lesson 8: Energy systems EOU assessment				