



A Level Physical Education – 2 Year Course Outline Anatomy, Physiology & Biomechanics

Four lessons per cycle/fortnight 1 homework per week		
Topic and approximate duration	Key learning areas Students should be able to:	Homework Options Students will be guided by the class teacher as to which level to complete (according to target level)
Autumn Term 1 Year 12		
Joints, movements and muscles	shoulder: <input type="radio"/> flexion, extension, abduction, adduction, horizontal flexion/extension, medial and lateral rotation, circumduction <input type="radio"/> deltoid, latissimus dorsi, pectoralis major, trapezius, teres minor elbow: <input type="radio"/> flexion, extension <input type="radio"/> biceps brachii, triceps brachii wrist: <input type="radio"/> flexion, extension <input type="radio"/> wrist flexors, wrist extensors hip: <input type="radio"/> flexion, extension, abduction, adduction, medial and lateral rotation <input type="radio"/> iliopsoas, gluteus maximus, medius and minimus, adductor longus, brevis and magnus knee: <input type="radio"/> flexion, extension <input type="radio"/> hamstring group: biceps femoris, semi-membranosus, semi-tendinosus <input type="radio"/> quadriceps group: rectus femoris, vastus lateralis, vastus intermedius and vastus medialis ankle: <input type="radio"/> dorsi flexion, plantar flexion	Muscle Movement Table

	<input type="radio"/> tibialis anterior, soleus, gastrocnemius planes of movement: <input type="radio"/> frontal <input type="radio"/> transverse <input type="radio"/> sagittal.	
Functional roles of muscles and types of contraction	roles of muscles: <input type="radio"/> agonist <input type="radio"/> antagonist <input type="radio"/> fixator types of contraction: <input type="radio"/> isotonic <input type="radio"/> concentric <input type="radio"/> eccentric <input type="radio"/> isometric.	Roles of the Muscles
Analysis of movement	analyse movement with reference to: <input type="radio"/> joint type <input type="radio"/> movement produced <input type="radio"/> agonist and antagonist muscles involved <input type="radio"/> type of muscle contraction taking place.	
Skeletal muscle contraction	structure and role of motor units in skeletal muscle contraction nervous stimulation of the motor unit: <input type="radio"/> motor neuron <input type="radio"/> action potential <input type="radio"/> neurotransmitter <input type="radio"/> 'all or none' law.	Skeletal Muscle Contraction
Muscle contraction during exercise of differing intensities and during recovery	muscle fibre types: <input type="radio"/> slow oxidative <input type="radio"/> fast oxidative glycolytic <input type="radio"/> fast glycolytic recruitment of different fibre types during exercise of differing intensities and during recovery.	Fibre Types
Cardiovascular system at rest	the relationship between, and resting values for: <input type="radio"/> heart rate <input type="radio"/> stroke volume <input type="radio"/> cardiac output	CV Questions

	<input type="radio"/> methods of calculating the above <ul style="list-style-type: none"> • cardiac cycle: <input type="radio"/> diastole <input type="radio"/> systole <ul style="list-style-type: none"> • conduction system of the heart linked to the cardiac cycle. 	
Cardiovascular system during exercise of differing intensities and during recovery	effects of different exercise intensities and recovery on: <input type="radio"/> heart rate <input type="radio"/> stroke volume <input type="radio"/> cardiac output <input type="radio"/> methods of calculating the above redistribution of cardiac output during exercise of differing intensities and during recovery: <input type="radio"/> vascular shunt mechanism <input type="radio"/> role of the vasomotor centre <input type="radio"/> role of arterioles <input type="radio"/> role of pre-capillary sphincters mechanisms of venous return during exercise of differing intensities and during recovery regulation of heart rate during exercise: <input type="radio"/> neural factors <input type="radio"/> hormonal factors <input type="radio"/> intrinsic factors.	CV System During Exercise Vascular System Questions
Autumn Term 2 Year 12		
Respiratory system at rest	relationship between resting values for: <input type="radio"/> breathing frequency <input type="radio"/> tidal volume <input type="radio"/> minute ventilation <input type="radio"/> methods of calculating the above mechanics of breathing at rest and the muscles involved: <input type="radio"/> diaphragm <input type="radio"/> external intercostals <input type="radio"/> at the alveoli <input type="radio"/> at the muscles.	Respiratory Questions

Respiratory system during exercise of differing intensities and during recovery	<p>effects of differing intensities of exercise and recovery on:</p> <ul style="list-style-type: none"> <input type="radio"/> breathing frequency <input type="radio"/> tidal volume <input type="radio"/> minute ventilation <p>mechanics of breathing during exercise of differing intensities and during recovery, including additional muscles involved:</p> <ul style="list-style-type: none"> <input type="radio"/> inspiration – sternocleidomastoid, pectoralis minor <input type="radio"/> expiration – internal intercostals, rectus abdominis. <p>regulation of breathing during exercise of different intensities and during recovery</p> <ul style="list-style-type: none"> <input type="radio"/> neural control <input type="radio"/> chemical control <p>effect of differing intensities of exercise and recovery on gas exchange at the alveoli and at the muscles</p> <ul style="list-style-type: none"> <input type="radio"/> changes in pressure gradient <input type="radio"/> changes in dissociation of oxyhaemoglobin. 	Respiratory Longer Question
Effect of Heat	<p>effect of altitude on the cardiovascular and respiratory systems:</p> <ul style="list-style-type: none"> <input type="radio"/> reduced arterial PO₂ (partial pressure of oxygen) leading to impaired muscle O₂ delivery <input type="radio"/> elevated heart rate and ventilation <p>acclimatisation, including the importance of timing arrival, at altitude (above 2400m).</p>	Research the effects of altitude or heat
Effect of Altitude	<p>effect of heat on the cardiovascular and respiratory systems:</p> <ul style="list-style-type: none"> <input type="radio"/> temperature regulation <input type="radio"/> cardiovascular drift. 	20Mq on Altitude
ATP	<p>ATP as 'energy currency'</p> <p>principle of energetically coupled reactions: <input type="radio"/> breakdown of ATP to ADP (Adenosine Diphosphate) + P (phosphate)</p> <ul style="list-style-type: none"> <input type="radio"/> resynthesis of ATP from ADP + P. 	ATP Questions

Energy Systems	<p>energy systems:</p> <ul style="list-style-type: none"> <input type="radio"/> ATP-PC (Phosphocreatine) system <input type="radio"/> glycolytic system <input type="radio"/> aerobic system <p>for each system:</p> <ul style="list-style-type: none"> <input type="radio"/> type of reaction (aerobic or anaerobic) <input type="radio"/> chemical or food fuel used <input type="radio"/> specific site of the reaction <input type="radio"/> controlling enzyme <input type="radio"/> ATP yield <input type="radio"/> specific stages within the system <input type="radio"/> by-products. 	<p>Energy Systems creative task 20MQ on Energy Systems</p>
Spring Term 1 Year 12		
Energy Continuum	<p>the energy continuum predominant energy system used during exercise:</p> <ul style="list-style-type: none"> <input type="radio"/> how intensity and duration of exercise influence which energy system is predominantly used to resynthesise ATP <input type="radio"/> interpretation of figures relating to the contribution of the three energy systems to exercise of different intensities and durations <p>interplay of energy systems during intermittent exercise and factors that affect this interplay</p> <ul style="list-style-type: none"> <input type="radio"/> intensity of exercise <input type="radio"/> duration of exercise <input type="radio"/> recovery periods <input type="radio"/> fitness levels. 	<p>20MQ on Energy Continuum</p>
Recovery Process	<p>how the body returns to its pre-exercise state:</p> <ul style="list-style-type: none"> <input type="radio"/> Excess Post exercise Oxygen Consumption (EPOC) <ul style="list-style-type: none"> • fast components of EPOC, the processes that occur and the duration: <ul style="list-style-type: none"> <input type="radio"/> replenishment of blood and muscle oxygen stores <input type="radio"/> re-synthesis of ATP and PC • slow components of EPOC, the processes that occur and the duration: <ul style="list-style-type: none"> <input type="radio"/> elevated circulation <input type="radio"/> elevated ventilation <input type="radio"/> elevated body temperature <input type="radio"/> lactate removal and conversion to glycogen 	<p>20MQ on Recovery</p>

	<ul style="list-style-type: none"> • effect of exercise intensity on EPOC and implications of the recovery process for planning exercise or training sessions. 	
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Complete Unit 1 Test 1 Hour

Spring Term 2 Year 12

<p>Periodisation & Principles of Training</p>	<p>periodisation cycles:</p> <ul style="list-style-type: none"> <input type="radio"/> macrocycle <input type="radio"/> mesocycle <input type="radio"/> microcycle <p>phases of training:</p> <ul style="list-style-type: none"> <input type="radio"/> preparatory <input type="radio"/> competitive <input type="radio"/> transition <p>tapering to optimise performance</p> <p>how to plan personal health and fitness programmes for aerobic, strength and flexibility training.</p>	<p>Periodisation Questions</p>
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<p>Aerobic Capacity Training</p>	<p>aerobic capacity and maximal oxygen uptake (VO₂max)</p> <ul style="list-style-type: none"> • how VO₂max is affected by: <ul style="list-style-type: none"> <input type="radio"/> individual physiological make-up <input type="radio"/> training <input type="radio"/> age <input type="radio"/> gender • methods of evaluating aerobic capacity: <ul style="list-style-type: none"> <input type="radio"/> laboratory test of VO₂max using direct gas analysis <input type="radio"/> NCF multi-stage fitness test <input type="radio"/> Queen's College step test <input type="radio"/> Cooper 12 minute run • intensity and duration of training used to develop aerobic capacity: <ul style="list-style-type: none"> <input type="radio"/> continuous training <input type="radio"/> high intensity interval training (HIIT) 	<p>Aerobic Capacity Questions</p>
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	<ul style="list-style-type: none"> • the use of target heart rates as an intensity guide physiological adaptations from aerobic training: <input type="radio"/> cardiovascular <input type="radio"/> respiratory <input type="radio"/> muscular <input type="radio"/> metabolic activities and sports in which aerobic capacity is a key fitness component. 	
<p>Strength Training</p>	<p>types of strength:</p> <ul style="list-style-type: none"> <input type="radio"/> strength endurance <input type="radio"/> maximum strength <input type="radio"/> explosive/elastic strength <input type="radio"/> static and dynamic strength <p>factors that affect strength:</p> <ul style="list-style-type: none"> <input type="radio"/> fibre type <input type="radio"/> cross sectional area of the muscle <p>methods of evaluating each type of strength:</p> <ul style="list-style-type: none"> <input type="radio"/> grip strength dynamometer <input type="radio"/> 1 Repetition Maximum(1RM) <input type="radio"/> press up or sit-up test <input type="radio"/> vertical jump test <p>training to develop strength:</p> <ul style="list-style-type: none"> <input type="radio"/> repetitions <input type="radio"/> sets <input type="radio"/> resistance guidelines used to improve each type of strength <input type="radio"/> use of multi-gym <input type="radio"/> weights <input type="radio"/> plyometrics <input type="radio"/> circuit/interval training: <ul style="list-style-type: none"> – work intensity – work duration – relief interval – number of work/relief intervals <p>physiological adaptations from strength training:</p> <ul style="list-style-type: none"> <input type="radio"/> muscle and connective tissues <input type="radio"/> neural 	<p>Strength Questions</p>

	<input type="radio"/> metabolic activities and sports in which strength is a key fitness component.	
Summer Term 1 Year 12		
Flexibility Training	<p>types of flexibility:</p> <input type="radio"/> static flexibility (active and passive) <input type="radio"/> dynamic flexibility <p>factors that affect flexibility:</p> <input type="radio"/> type of joint <input type="radio"/> length of surrounding connective tissue <input type="radio"/> age <input type="radio"/> gender <p>methods of evaluating flexibility:</p> <input type="radio"/> sit and reach test <input type="radio"/> goniometer <p>training used to develop flexibility:</p> <input type="radio"/> passive stretching <input type="radio"/> proprioceptive neuromuscular facilitation (PNF) <input type="radio"/> static stretching <input type="radio"/> dynamic stretching <input type="radio"/> ballistic stretching <input type="radio"/> isometric stretching <p>physiological adaptations from flexibility training:</p> <input type="radio"/> muscle and connective tissues <p>activities and sports in which flexibility is a key fitness component.</p>	Flexibility Research Flexibility Questions
Diet & Nutrition	<p>function and importance of the components of a healthy, balanced diet:</p> <input type="radio"/> carbohydrates <input type="radio"/> proteins <input type="radio"/> fats <input type="radio"/> minerals <input type="radio"/> vitamins	Diet & Nutrition Questions

	<input type="radio"/> fibre <input type="radio"/> water energy intake and expenditure and energy balance in physical activity and performance.	
Ergogenic Aids	use of ergogenic aids; potential benefits and risks: <input type="radio"/> pharmacological aids: – anabolic steroids – erythropoietin (EPO) – human growth hormone (HGH) <input type="radio"/> physiological aids: – blood doping, – intermittent hypoxic training (IHT) – cooling aids nutritional aids: – amount of food – composition of meals – timing of meals – hydration – glycogen/carbohydrate loading – creatine – caffeine – bicarbonate – nitrate.	Ergogenic Aids Research
The Impact of Training on Lifestyle	the effect of training on lifestyle diseases: <input type="radio"/> cardiovascular system : – coronary heart disease (CHD) – stroke – atherosclerosis – heart attack <input type="radio"/> respiratory system – asthma – chronic obstructive pulmonary disease (COPD).	
Acute Injuries	acute injuries resulting from a sudden stress to the body: <input type="radio"/> hard tissue injuries <input type="radio"/> soft tissue injuries <input type="radio"/> concussion	Acute Injuries Questions

	<p>chronic injuries resulting from continuous stress to the body:</p> <ul style="list-style-type: none"> <input type="radio"/> soft tissue injuries <input type="radio"/> hard tissue injuries. 	
Injury Prevention	<p>intrinsic risk factors:</p> <ul style="list-style-type: none"> <input type="radio"/> individual variables <input type="radio"/> training effects <p>extrinsic risk factors:</p> <ul style="list-style-type: none"> <input type="radio"/> poor technique/training <input type="radio"/> incorrect equipment/clothing <input type="radio"/> inappropriate intensity, duration or frequency of activity debate surrounding effective warm up and cool down. <p>assessing sporting injuries using 'SALTAPS'</p> <ul style="list-style-type: none"> <input type="radio"/> See <input type="radio"/> Ask <input type="radio"/> Look <input type="radio"/> Touch <input type="radio"/> Active <input type="radio"/> Passive <input type="radio"/> Strength <p>acute management of soft tissue injuries using 'PRICE'</p> <ul style="list-style-type: none"> <input type="radio"/> Protection <input type="radio"/> Rest <input type="radio"/> Ice <input type="radio"/> Compression <input type="radio"/> Elevation <p>recognising concussion: IRB's 'Recognise and Remove' 6 R's</p> <ul style="list-style-type: none"> <input type="radio"/> Recognise <input type="radio"/> Remove <input type="radio"/> Refer <input type="radio"/> Rest <input type="radio"/> Recover <input type="radio"/> Return. 	Injury Prevention Questions
Rehabilitation of Injuries	<p>treatment of common sporting injuries:</p> <ul style="list-style-type: none"> <input type="radio"/> injuries: - fractures – simple, stress 	Rehabilitation 10 Mark Question

	<ul style="list-style-type: none"> - joint injuries – dislocation, sprain, torn cartilage - exercise-induced muscle damage ○ treatments: - stretching - massage - heat, cold and contrast therapies - anti-inflammatory drugs - physiotherapy - surgery 	
Summer Term 2 Year 12		
Revision	Revision Programme for the Year 12 Mock Past paper materials and questions to review prior learning	
Autumn Term 1 Year 13		
Levers	components of a lever system: <ul style="list-style-type: none"> ○ load ○ effort ○ fulcrum ○ effort arm ○ load arm 1st class lever 2nd class lever 3rd class lever mechanical advantage of a 2nd class lever.	Lever questions
Biomechanical Principles	Define and apply Newton’s laws of motion: <ul style="list-style-type: none"> ○ Newton’s first law: inertia ○ Newton’s second law: acceleration ○ Newton’s third law: reaction Force: <ul style="list-style-type: none"> ○ net force ○ balanced and unbalanced force ○ weight ○ reaction ○ friction 	Biomechanical Principles

	<input type="radio"/> air resistance <input type="radio"/> factors affecting friction and air resistance and their manipulation in sporting performance <input type="radio"/> free body diagrams showing vertical and horizontal forces acting on a body at an instant in time and the resulting motion <input type="radio"/> calculations of force, momentum, acceleration and weight <input type="radio"/> definition of centre of mass <input type="radio"/> factors affecting the position of the centre of mass <input type="radio"/> the relationship between centre of mass and stability.	
Analysing Movement with Technology	definitions and uses of: <input type="radio"/> limb kinematics <input type="radio"/> force plates <input type="radio"/> wind tunnels how each type of technology may be used to optimise performance in sport.	Technology HW
Autumn Term 2 Year 13		
Linear Motion	definition of linear motion. <ul style="list-style-type: none"> • creation of linear motion by the application of a direct force through the centre of mass • definitions, calculations and units of measurement for each of the following quantities of linear motion: <ul style="list-style-type: none"> <input type="radio"/> distance <input type="radio"/> displacement <input type="radio"/> speed <input type="radio"/> velocity <input type="radio"/> acceleration/deceleration • plot and interpret graphs of linear motion: <ul style="list-style-type: none"> <input type="radio"/> distance/time graphs <input type="radio"/> speed/time graphs <input type="radio"/> velocity/time graphs. 	Linear Motion Questions
Angular Motion	definition of angular motion <ul style="list-style-type: none"> • creation of angular motion through the application of an eccentric force about one (or more) of the three axes of rotation: <ul style="list-style-type: none"> <input type="radio"/> longitudinal <input type="radio"/> frontal <input type="radio"/> transverse 	Angular Motion Questions

	<ul style="list-style-type: none"> • definitions, calculations and units of measurement for each quantity of angular motion: <ul style="list-style-type: none"> <input type="radio"/> moment of inertia <input type="radio"/> angular velocity <input type="radio"/> angular momentum • factors affecting the size of the moment of inertia of a rotating body: <ul style="list-style-type: none"> <input type="radio"/> mass of the body (or body part) <input type="radio"/> distribution of the mass from the axis of rotation • the relationship between moment of inertia and angular velocity the conservation of angular momentum during flight in relation to the angular analogue of Newton's first law of motion • interpret graphs of angular velocity, moment of inertia and angular momentum. 	
<p>Fluid Mechanics</p>	<p>factors that impact the magnitude of air resistance (on land) or drag (in water) on a body or object:</p> <ul style="list-style-type: none"> <input type="radio"/> velocity <input type="radio"/> mass <input type="radio"/> frontal cross-sectional area <input type="radio"/> streamlining and shape <input type="radio"/> surface characteristics. 	<p>Fluid Mechanics comparison question with friction & air resistance</p>
<p>Projectile Motion</p>	<p>factors affecting the horizontal distance travelled by a projectile:</p> <ul style="list-style-type: none"> <input type="radio"/> height of release <input type="radio"/> speed of release <input type="radio"/> angle of release • free body diagrams showing the forces acting on a projectile once in flight: <ul style="list-style-type: none"> <input type="radio"/> weight <input type="radio"/> air resistance • resolution of forces acting on a projectile in flight using the parallelogram of forces • patterns of flight paths as a consequence of the relative size of air resistance and weight <ul style="list-style-type: none"> <input type="radio"/> parabolic (symmetrical) flight path <ul style="list-style-type: none"> – shot put <input type="radio"/> non-parabolic (asymmetric) flight path <ul style="list-style-type: none"> – badminton shuttle • The addition of lift to a projectile through the application of Bernoulli's principle: <ul style="list-style-type: none"> <input type="radio"/> angle of attack to create an upwards lift force on a projectile: <ul style="list-style-type: none"> – discus 	<p>Projectile Motion Research Projectile Motion Questions</p>

	<ul style="list-style-type: none"> – javelin – ski jumper • design of equipment to create a downwards lift force: <ul style="list-style-type: none"> <input type="radio"/> F1 racing cars <input type="radio"/> track cycling • use of spin in sport to create a Magnus force, causing deviations to expected flight paths: <ul style="list-style-type: none"> <input type="radio"/> imparting spin to a projectile through the application of an eccentric force <input type="radio"/> types of spin: <ul style="list-style-type: none"> – top spin, side spin and back spin in tennis and table tennis – side spin in football – hook and slice in golf. 	
Mock Paper		
EAPI Preparation	Work on the verbal assessment worth 10% of overall assessment.	

Lessons after this time will focus on revision, recapping content and other examination preparation.

Throughout the year there will be a number of homework tasks which will be in the form of revision for upcoming tests.