

# Course Outline (Higher Education)

<b>School:</b>	School of Health and Life Sciences
<b>Course Title:</b>	PHYSIOLOGICAL BASES OF HUMAN MOVEMENT I
<b>Course ID:</b>	EXSCI1005
<b>Credit Points:</b>	10.00
<b>Prerequisite(s):</b>	Nil
<b>Co-requisite(s):</b>	Nil
<b>Exclusion(s):</b>	Nil
<b>ASCED Code:</b>	10913

## Description of the Course :

This course is designed to introduce students to the basics of how the body functions from the cells to key physiological systems such as the muscular, nervous, cardio-vascular, respiratory, hormonal, digestive, immune systems. It is envisaged this course will provide the fundamental physiology knowledge that is required in exercise testing and prescription.

**Grade Scheme:** Graded (HD, D, C, etc.)

## Program Level:

AQF Level of Program						
	5	6	7	8	9	10
Level						
Introductory	■	■	✓	■	■	■
Intermediate	■	■	■	■	■	■
Advanced	■	■	■	■	■	■

## Learning Outcomes:

### Knowledge:

- K1.** Demonstrate knowledge of basic cell function and biochemistry related to the human body.
- K2.** Describe the biochemical pathways by which fat, carbohydrate and protein substrates are catabolised to produce ATP.
- K3.** Describe the mechanism of muscle contraction and the role of ATP and Calcium, and factors that determine the force and velocity of contraction (e.g. motor recruitment, muscle length, contribution of passive elements, muscle fibre type, muscle architecture, rate of neural activation).
- K4.** Describe the characteristics of smooth, cardiac and skeletal muscle.
- K5.** Describe how graded and action potentials are generated in nerves and the role of neurotransmitters in conducting electricity in our body.
- K6.** Explain the roles of parasympathetic and sympathetic nervous system, somatic motor control, reflex arcs and how sensory perception results in motor actions.

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- K7.** Understand how heart rate, stroke volume and blood pressure are intrinsically and extrinsically regulated.
- K8.** Explain an ECG trace and how exercise and common pathologies affects it.
- K9.** Explain how the vascular system regulates blood pressure and flow throughout the body.
- K10.** Describe the effects of commonly prescribed medication that may influence the heart rate, blood pressure and electrocardiographic responses to exercise.
- K11.** Understand the mechanisms underlying abnormal electrocardiographic responses to exercise of varying duration and intensity.
- K12.** Discuss the importance of erythrocytes, leukocytes and platelets to the body and factors affecting their activity.
- K13.** Identify factors regulating ventilation gaseous exchange and distribution of oxygen supply to and removal of CO<sub>2</sub> from to the tissues.
- K14.** Describe how the kidneys regulate the filtration rate, reabsorb nutrients and secrete waste and regulate blood volume and pressure.
- K15.** Explain the stimulus and effect of the major hormones.
- K16.** Explain how the specific and nonspecific immune systems mount attacks against pathogens.

### Skills:

- S1.** Practise the correct and accurate conduct and interpretation of spirometry.
- S2.** Illustrate proficiency in the use of isokinetic dynamometry.
- S3.** Demonstrate an ability to measure heart rate, blood pressure and rating of perceived exertion before, during and after submaximal fitness tests.
- S4.** Become proficient in blood grouping.

### Application of knowledge and skills:

- A1.** The knowledge and understanding of physiology will be applied in drawing diagrams of key physiological functions and answering questions in the tests that may be in clinical or sporting context.

### Course Content:

Week	Lecture content	Practical/tutorial content	NUCAP criteria covered
1	<b>Homeostasis</b> Content: negative and positive feedback systems <b>Biochemistry</b> Content: inorganic and organic molecules	<b>Chemistry &amp; sport application 2.21</b> Atoms & Bonds, solutions, concept of mol. Prepare composition of beverage maximising hydration after exercise.	
2	<b>Biochemistry</b> Content: Cellular integration - factors affecting cell movement in and out of cells, role of cell organelles	<b>Chemistry &amp; sport application 2.21</b> Atoms & Bonds, solutions, concept of mol. Prepare composition of beverage maximising hydration after exercise.	

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<b>3</b>	<p><b>Cell function</b> Content: mitosis, meiosis, apoptosis, cell death</p> <p><b>Protein synthesis</b> Content: DNA and RNA, translation and transcription</p>	<p><b>Metabolism</b> Metabolic pathways which fat, carbohydrate and protein build ATP.</p>	
<b>4</b>	<p><b>Metabolism</b> Content: role of creatine phosphate, carbohydrate, fat and protein in producing ATP, glycolysis, Krebs cycle and the electron transport chain</p>	<p><b>Metabolism</b> Metabolic pathways which fat, carbohydrate and protein build ATP.</p>	2.6
<b>5</b>	<p><b>Nerve physiology</b> Content: Graded potentials, action potentials, neurotransmitters and receptors; propagation of action potential; synapses; motor recruitment, parasympathetic and sympathetic</p> <p><b>Warning Uncontrolled when printed! The curriculum</b></p>	<p><b>Muscle/nerve physiology</b> Length tension, force velocity relationships, neural adaptation, divergent, convergent neural pathways, reflexes.</p>	1.54, 9.1, 9.2
<b>rent version of this document the UB is kept on website.</b>			
	nervous system, somatic motor control, reflex arcs and sensory perception		
<b>6</b>	<p><b>Muscle physiology</b> Content: skeletal muscle contraction; factors affecting force, velocity and duration of muscle contraction</p>	<p><b>Muscle/nerve physiology</b> Length tension, force velocity relationships, neural adaptation, divergent, convergent neural pathways, reflexes.</p>	2.4, 2.5, 9.7, 1.54
<b>7</b>	<p><b>Neural Integration</b> Content: Graded potentials, action potentials, neurotransmitters and receptors; propagation of action potential; synapses; motor recruitment, parasympathetic and sympathetic nervous system, somatic motor control, reflex arcs and sensory perception Digestive physiology - factors affecting absorption and transport of carbohydrate, proteins and fat</p>	<p><b>ECG/blood pressure</b> Assess sub-maximal VO<sub>2</sub>, electrical heart activity from ECG and blood pressure at rest and during exercise. Medication considerations on the cardiovascular response.</p>	2.3, 5.7, 5.18, 9.3, 9.4, 5.15
<b>8</b>	<p><b>Cardiac physiology</b> Content: physiology of auto-rhythmic &amp; cardiac cells, intrinsic and extrinsic regulation of cardiac output, cardiac cycle, electrocardiogram <b>TEST</b></p>	<p><b>ECG/blood pressure</b> Assess sub-maximal VO<sub>2</sub>, electrical heart activity from ECG and blood pressure at rest and during exercise. Medication considerations on the cardiovascular response.</p>	2.3, 5.7, 5.8, 5.15
<b>9</b>	<p><b>Vascular physiology</b> Content: factors regulating blood flow, pressure and blood distribution to tissues Blood physiology</p>	<p><b>Respiratory Physiology</b> Assess forced vital capacity forced expiratory volume in 1 second and peak flow from spirometry.</p>	2.28

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<b>10</b>	<b>Respiratory physiology</b> Content: Pulmonary ventilation, factors affecting gas exchange in lungs and tissues, gas transport, regulation of ventilation	<b>Respiratory Physiology</b> Assess forced vital capacity forced expiratory volume in 1 second and peak flow from spirometry.	2.28
<b>11</b>	<b>Renal physiology</b> Content: Regulation of glomerular filtration rate, reabsorption, secretion , formation of concentrated or dilute urine Fluid & pH regulation	<b>Blood grouping</b> Assess individual blood type.	
<b>12</b>	<b>Endocrine physiology</b> Content: functions, controls and effects of hormones <b>Immune physiology</b> Content: specific and non-specific defences to pathogens	<b>Blood grouping</b> Assess individual blood type.	

## Values and Graduate Attributes:

### Values:

- V1.** Develop an appreciation of an evidence based approach to the physiological bases of human movement

### Graduate Attributes:

Attribute	Brief Description	Focus
Continuous Learning	Students will be encouraged to develop knowledge of how the body functions. This knowledge will serve as the platform students develop and optimise intervention strategies to maximise human performance.	High
Self Reliance	Students will be encouraged to develop their own knowledge, independent critical analysis by reading relevant journal-articles and the prescribed text . Students will be also given practical scenarios in exams that require reflection to form their answer from an evidence based perspective.	Medium
Engaged Citizenship	In tutorials, students will learn often goals need to be achieved by working with solidarity which will foster development of community oriented individuals.	Low
Social Responsibility	In tutorial students will be encouraged to work collegially in small groups to achieve tasks fostering team-work, patience, support, respect and empathy.	Low

## Learning Task and Assessment:

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Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
A1, K1-K5	Review of theoretical and laboratory content.	Test 1	40-60%
A1, K6-K16	Review of theoretical and laboratory	Test 2	40 - 60%
S1 S4	Practical skill competency (Spirometry, ECG, blood pressure)	Demonstration of Practical Skill	S/U
	Participation in tutorial activities	90% tutorial attendance	S/U

## Adopted Reference Style:

APA