

**MODULE SPECIFICATION**

Part 1: Information			
Module Title	Pathophysiological Sciences A		
Module Code	USSKL9-30-2	Level	3
For implementation from	September 2017		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Health & Applied Sciences	Field	Applied Sciences
Department	Applied Sciences		
Contributes towards	BSc (Hons) Healthcare Science (Physiological Sciences) FdSc Healthcare Science		
Module type:	Standard		
Pre-requisites	USSJT5-30-1 Scientific Basis of Life USSKA9-30-1 Introduction to Physiological Sciences and Patient Care USSJT8-30-1 Anatomy and Physiology		
Excluded Combinations	N/A		
Co-requisites	USSKLA-30-2 Pathophysiological Sciences B		
Module Entry requirements	N/A		

Part 2: Description
<p>This module explores the various aspects of pathophysiological sciences and contains five distinct units, namely</p> <ul style="list-style-type: none"> • Unit 1: Cardiac Physiology A • Unit 2: Respiratory & Sleep Physiology A • Unit 3: Applied Neurophysiology and pathophysiology • Unit 4: Pathophysiology of CVRS & physiological measurement • Unit 5: Measurement Techniques <p>Students complete two of these units as prescribed by their pathway, namely</p> <ul style="list-style-type: none"> • Cardiac Physiology: Units 1 & 4 • Respiratory & Sleep Physiology: Units 2 & 4 • Neurophysiology: Units 3 & 5 <p>The syllabus covers:</p> <p>1. Cardiac Physiology A [Cardiac Physiology pathway]</p> <ul style="list-style-type: none"> • Clinical Electrocardiography • Development of a framework for interpretation of Electrocardiograms

- The Normal Electrocardiogram from birth to old age
- Recognition of life threatening arrhythmias
- Recognition of:
 - Common arrhythmias
 - The effect of myocardial infarction and ischaemia on the electrocardiogram
- Management of common arrhythmias.

2. Respiratory & Sleep Physiology A [Respiratory & Sleep Physiology pathway]

- Pathophysiological basis of changes in lung function tests observed in common lung diseases.
- Pharmacology – basic principles (receptors, pharmacodynamics, pharmacokinetics)
- Lung Functions in context – Clinical History, X-Rays. HRCT, Blood Tests
- Assessing Lung Function – which test for which question?
- Techniques used in the assessment of lung function
- Reference ranges, LLN and SR's
- Reporting Results
- Dynamic Lung Volumes and Flows
- Reversibility Testing

4. CVRS Pathophysiology B [All pathways expect Neurophysiology]

- Cardiac Disease: Ischaemic heart disease and myocardial infarction; Acquired valvular disease; Hypertensive heart disease; Cardiomyopathy; Congenital heart disease; Autonomic disorders; Heart failure
- Respiratory Diseases: Chronic obstructive pulmonary disease; Asthma; Restrictive lung disease; Congenital and genetic lung conditions; Pneumonia; Lung cancer; Pulmonary Vascular Disorders; Cystic fibrosis; Obstructive sleep apnoea; Central sleep apnoea; Respiratory muscle disorders; Occupational lung disease
- The role of respiratory mechanics in control of breathing; Effect of neuromuscular disease on the respiratory system

3. Applied Neurophysiology and pathophysiology [Neurophysiology pathway]

- Anatomy of the central and peripheral nervous systems
- Pathophysiology of common conditions affecting the central and peripheral nervous system
- Genetic basis of diseases of the central nervous system
- Immunological basis of diseases of the central nervous system
- Pathophysiology of mental illness, including epilepsy, major depression, psychosis, schizophrenia, ADHD, and autism spectrum disorder
- Infections of the brain and spinal cord, including meningitis and encephalitis
- Pathophysiology of neurodegenerative diseases
- Pharmacological interventions and drug therapy in the central nervous system
- Non-pharmaceutical treatments of the central nervous system, including diet, surgery and cognitive behavioural therapy

5. Measurement Techniques

- Basics of Instrumentation: Electronic circuits; Amplifiers; Noise; Filters; Digitisation; Biological and non-biological artefacts; Principles of calibration and maintenance of test equipment following national and international standards
- Medical Imaging, including Magnetic Resonance Imaging and Positron Emission Tomography
- Basic principles and methods of psychophysics, psychoacoustics and sound perception
- Basic principles and methods of electrophysiology

There will be 3 weeks of contact time at UWE in 3 x 1 week blocks. Included in each block week are laboratory workshops, lectures and tutorials. The contact time will equate to approximately 12 hours per block (a total of 36 hours).

In addition to the allocated hours on campus learning, students will engage in synchronous and asynchronous online learning. This will comprise a total of approximately 36 hours of online engagement through a combination of lectures, synchronous online tutorials, synchronous and asynchronous discussions, online quizzes, and collaborative group work.

Theoretical material within the module will be presented to the students in the form of regular lectures throughout each of the semesters in the academic year. During those times of work based learning, these lectures will be delivered online and involve a number of technological enhancements. The learning of lecture content will be reinforced through time spent in independent learning by the directed reading of recommended texts and through the use of technology enhanced learning resources that will be provided online. This online learning and engagement will be delivered through several avenues:

- Synchronous online tutorials in protected learning time where the student will contribute/attend an online activity appropriate to the content at the time at which the academic will be present online to facilitate and lead this scheduled/timetabled session. This tutorial will be themed/planned.
- Asynchronous discussions in the student's own time (or during protected time where permitted and appropriate) where they will engage/collaborate with other students on the course or in specified groups, and in which the academic is permitted to moderate where necessary, but is not expected to contribute.
- Synchronous surgery sessions timetabled for a specific time in which the academic will be available online to answer live questions via discussion boards/blogs/collaborate or to respond to questions posted/asked prior to the session.
- Interactive, online formative quizzes made available either following a particular package of knowledge exchange/learning, or in specified sessions/time periods.
- Lectures delivered online through a combination of one or more of the following: visual/audio/interactivity/personal formative assessment

A number of relevant practical sessions will be incorporated during the campus based blocks in addition to the work based learning that must be achieved under supervision by a workplace supervisor. Practical sessions will both drive hands on learning and the acquisition of technical skills at both an individual and group working level.

The remainder of the independent learning time allocated to the module should be spent preparing written assessments for submission [B1], and undertaking revision for the exams [A1, A2].

Scheduled learning includes lectures, seminars, tutorials, project supervision, demonstration, practical classes and workshops; fieldwork; external visits; work based learning; supervised time in studio/workshop.

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc. These sessions constitute an average time per level as indicated in the table below. Scheduled sessions may vary slightly depending on the module choices you make.

Part 3: Assessment

The assessments within this module have been designed to show that the student has developed the required knowledge and clinical skills required to practice as a cardiac physiologist, respiratory and sleep physiologist or neurophysiologist, as appropriate. There will two components to the assessment of this module.

Component A

The written exam will provide students with an opportunity to demonstrate both their knowledge on a broad range of topics through a series of short essay questions. The in-class open book test will assess the students' ability to research relevant information and provide critical thinking in a variety workplace scenarios where the application of knowledge is required.

Component B

The first element will be an independent case study of direct relevance to the student's employment, which is to be prepared and presented for assessment as an oral presentation during a block attendance at university. The second element is a contextual review of a recent article related to diagnostic advance(s) in a technique(s) of relevance to the student's employment, the content of which will be negotiated with the appropriate academic tutor.

Formative feedback is available to students throughout the module through group discussions, and in workshops. Students are provided with formative feed-forward for their exam through a revision and exam preparation session prior to the exam and through the extensive support materials supplied through Blackboard.

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session prior to the exam and through the extensive support materials supplied through Blackboard.

All work is marked in line with the Faculty's Generic Assessment Criteria and conforms to university policies for the setting, collection, marking and return of student work. Where an individual piece of work has specific assessment criteria, this is supplied to the students when the work is set.

This assessment strategy has been designed following best practice on effective assessment from JISC (<http://www.jisc.ac.uk/whatwedo/programmes/elearning/assessment/digiassess.aspx>) and The Open University's Centre for Excellence in Teaching and Learning (<http://www.open.ac.uk/opencetl/centre-open-learning-mathematics-science-computing-and-technology/activities-projects/e-assessment-learning-the-interactive-comp>).

Technical design and deployment of the activities will also follow best practice developed at UWE by the Education Innovation Centre in collaboration with academic colleagues across the university. Staff guidance and support are already in place (<http://info.uwe.ac.uk/online/Blackboard/staff/guides/summative-assessments.asp>).

Identify final timetabled piece of assessment (component and element)	A1	
% weighting between components A and B (Standard modules only)	A:	B:
	50	50
First Sit		
Component A (controlled conditions) Description of each element	Element weighting (as % of component)	
1. Examination (1.5 hours)	50%	
2. In class assessment (1.5 hours)	50%	
Component B Description of each element	Element weighting (as % of component)	
1. Case study oral presentation	50%	
2. Short contextual review (1000 words)	50%	
Resit (further attendance at taught classes is not required)		
Component A (controlled conditions) Description of each element	Element weighting (as % of component)	
1. Examination (3 hours)	100%	
Component B Description of each element	Element weighting (as % of component)	
1. Case study oral presentation	50%	
2. Short contextual review (1000 words)	50%	

Part 4: Teaching and Learning Methods**Learning Outcomes**

On successful completion of this module students will be able to fulfil the learning outcomes from 2 of the following 5 Physiological Sciences themed units of study:

- Unit 1: Cardiac Physiology A
- Unit 2: Respiratory & Sleep Physiology A
- Unit 3: Applied Neurophysiology and pathophysiology
- Unit 4: Pathophysiology of CVRS and physiological measurement
- Unit 5: Measurement Techniques

where the units as prescribed by their pathway, namely

- Cardiac Physiology: Units 1 & 4
- Respiratory & Sleep Physiology: Units 2 & 4
- Neurophysiology: Units 3 & 5

Assessment intended for each learning outcome designated by [*] corresponding to assessment section:

1. Cardiac Physiology A [Cardiac Physiology pathway]

- Know and use in context the abbreviations and units used in Cardiac Physiology [A1, B1]
- Describe the concept of “normal” and the calculation and use of normal ranges in the interpretation of cardiac investigations and demonstrate the ability to apply these to clinical situations [A1, B1]
- Recognise the normal physiological variability in humans [A1]
- Explain the need for calibration and quality assurance for all measurements undertaken in Cardiac Physiology [A1]
- Explain the clinical framework for, and basic principles of: clinical electrocardiography; the normal electrocardiogram from birth to old age; common arrhythmias; interpretation of electrocardiograms [A1, B2]
- Recognise life-threatening arrhythmias [A1]
- Outline management of common arrhythmias (e.g. AT/VT) [A1]

2. Respiratory & Sleep Physiology A [Respiratory & Sleep Physiology pathway]

- Know and apply the abbreviations and units used in Respiratory and Sleep Science [A1]
- Explain the concept of “normal” and the calculation, use and limitations of reference values, reference ranges, Lower Limits of Normal (LLN) and standardized residuals [A1]
- Explain the normal physiological variability in humans in a range of tests from birth to old age [A1, B1]
- Describe the generation and use of reference ranges to define normal and abnormal lung function and apply knowledge to calculate reference ranges, LLN and Standardized residuals [A1]
- Explain the need for calibration and quality assurance for all measurements undertaken in Respiratory and Sleep Science [A1, B1]
- Explain the application of dynamic lung volumes and flows in routine clinical practice and analyse data [A1, B1, B2]
- Compare different techniques to estimate lung volumes and the limitations of each technique [A1, B1]
- Discuss the role and application of inhaled drug therapy (Bronchodilators) in the management of respiratory disease [A1]

3. Pathophysiology of CVRS and physiological measurement [All pathways expect Neurophysiology]

- Understand major abnormalities of physiological control mechanisms in diseases of the Cardiac, Vascular and Respiratory systems [A1,A2, B1, B2]
- Explain cellular, tissue and systems responses to diseases of the Cardiac, Vascular and Respiratory systems [A1, A2, B1]


- Describe the basis of common infections of the Cardiac, Vascular and Respiratory systems [A1,A2, B1]
- Describe common diseases that affect the Cardiac, Vascular, Respiratory and Sleep Physiology [A1, A2, B1]
- Describe treatment strategies for Cardiovascular and respiratory system disorders [A1, A2, B1]
- Gain an awareness of primary and secondary disorders [A1, A2, B1]
- Discuss the effects of amplifier characteristics on the quality of the recorded signal, and their influence on recording methodology [A2]
- Discuss the operation, specification, advantages and limitations of filters [A2]
- Outline the principles of signal digitisation [A2]
- Explore the methods and applications of computer acquisition, storage, and analysis of signals in clinical physiology [A2]
- Explain the principles and methods of electrophysiological measurement [A2, B2]
- Investigate principles and applications of biomedical imaging techniques [A2]

4. Applied Neurophysiology and pathophysiology [Neurophysiology pathway]

- Recall the normal structure and function of the brain and spinal cord [A1]
- Explain the epidemiology of commonly referred pathophysiology to clinical neurophysiology services [A1]
- Describe the types of genetic error responsible for common abnormalities affecting the brain and spinal cord [A1]
- Discuss the immunological basis of diseases, with particular emphasis on conditions in patients commonly referred to clinical neurophysiology [A1, B1]
- Describe major abnormalities of physiological control mechanisms in diseases of the brain and spinal cord [A1, B1]
- Describe cellular, tissue and systems responses to diseases of the brain and spinal cord, e.g. brain haemorrhage, cerebral infarction, brain tumours and dementia [A1, B1]
- Describe the basis of common infections of the brain and spinal cord, e.g. meningitis, encephalitis, brain abscess [A1]
- Describe the principles of drug action and pharmacokinetics and correlate these to drug therapy, with specific reference to conditions in patients commonly referred to clinical neurophysiology services [A1, B1]
- Discuss the principle non-pharmaceutical treatments relevant to patients commonly referred to clinical neurophysiology to include diet, surgery and cognitive behavioural therapy [A1, B1]

5. Measurement Techniques

- Discuss the effects of amplifier characteristics on the quality of the recorded signal, and their influence on recording methodology [A2]
- Discuss the operation, specification, advantages and limitations of filters [A2]
- Outline the principles of signal digitisation [A2]
- Explore the methods and applications of computer acquisition, storage, and analysis of signals in clinical physiology [A2]
- Explain the principles and methods of electrophysiological measurement [A2, B2]
- Explain the principles and methods of psychophysical measurement [A2, B2]
- Investigate principles and applications of biomedical imaging techniques [A2]

Key Information Sets Information (KIS)																																										
	Hours to be allocated	Scheduled learning and teaching study hours	Independent study hours	Placement study hours	Allocated Hours																																					
	300	72	228	0	300																																					
Contact Hours	The table below indicates as a percentage the total assessment of the module which constitutes a;																																									
Total Assessment	Written Exam: Unseen written exam, open book written exam, in-class test																																									
	Coursework: Written assignment or essay, report, dissertation, portfolio, project or in class test																																									
	Practical Exam: Oral Assessment and/or presentation, practical skills assessment, practical exam (i.e. an exam determining mastery of a technique)																																									
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Reading List	<p>Modernising Scientific Careers Programme Training Manual for appropriate Division and Specialist Route. Available from http://www.nshcs.hee.nhs.uk/curricula</p> <p>The module reading list can be accessed through the following link:</p> <p>https://uwe.rl.talis.com/lists/B59F1865-DDA7-7DC1-ABD7-5652740C9054.html</p>																																									

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First CAP Approval Date	2/2/2016			
Revision CAP Approval Date	31/5/2017	Version	2	RIA 12283