Module Specification

Pathophysiological Sciences A

Version: 2023-24, v2.0, 13 Jun 2023

Contents

Part 1: Information

Module title: Pathophysiological Sciences A

Module code: USSKL9-30-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Health & Applied Sciences

Department: HAS Dept of Applied Sciences

Partner institutions: None

Field: Applied Sciences

Module type: Module

Pre-requisites: Anatomy and Physiology 2023-24, Introduction to Physiological Sciences and Patient Care 2023-24, Scientific Basis of Life *NO LONGER RUNNING* 2023-24

Excluded combinations: None

Co-requisites: Pathophysiological Sciences B 2023-24

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module explores the various aspects of pathophysiological sciences and contains five distinct units, namely

Unit 1: Cardiac Physiology A
Unit 2: Respiratory and Sleep Physiology A

Unit 3: Applied Neurophysiology and pathophysiology

Unit 4: Pathophysiology of CVRS and physiological measurement

Unit 5: Measurement Techniques

Students complete two of these units as prescribed by their pathway, namely

Cardiac Physiology: Units 1 and 4

Respiratory and Sleep Physiology: Units

Neurophysiology: Units 3 and 5

Pre-requisites: students must have passed USSJT5-30-1 Scientific Basis of Life, USSKA9-30-1 Introduction to Physiological Sciences and Patient Care, USSJT8-30-1 Anatomy and Physiology.

Co-requisites: USSKLA-30-2 Pathophysiological Sciences B

Features: Not applicable

Educational aims: See learning outcomes.

Outline syllabus: Cardiac Physiology A (Cardiac Physiology pathway):

Clinical Electrocardiography

Development of a framework for interpretation of lectrocardiograms

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.

Respiratory and Sleep Physiology A (Respiratory and 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

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

Applied Neurophysiology and pathophysiology (Neurophysiology pathway):

Anatomy of the central and peripheral nervous systems

Pathophysiology if 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

Measurement Techniques:

Basics of Instrumentation: Electronic circuits; Amplifiers; Noise; Filters; Digitisation;
Biological and nonbiological 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

Part 3: Teaching and learning methods

Teaching and learning methods: 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.

If possible (due to COVID-19 restrictions), 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. If onsite Block Weeks are not

possible due to COVID-19, these sessions will be delivered as online workshops and lectures/tutorials.

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

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. These sessions constitute an average time per level. Scheduled sessions may vary slightly depending on the module choices you make.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Cardiac Physiology A (Cardiac Physiology pathway) - Know and use in context the abbreviations and units used in Cardiac Physiology

MO2 Cardiac Physiology A (Cardiac Physiology pathway) - 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

MO3 Cardiac Physiology A (Cardiac Physiology pathway)- Recognise the normal physiological variability in humans

MO4 Cardiac Physiology A (Cardiac Physiology pathway) - Explain the need for calibration and quality assurance for all measurements undertaken in Cardiac Physiology

MO5 Cardiac Physiology A (Cardiac Physiology pathway) - Explain the clinical framework for, and basic principles of: clinical electrocardiography; the normal electrocardiogram from birth to old age; common arrhythmias; interpretation of electrocardiograms

MO6 Cardiac Physiology A (Cardiac Physiology pathway) - Recognise life-threatening arrhythmias - Know and apply the abbreviations and units used in Respiratory and Sleep Science

MO7 Cardiac Physiology A (Cardiac Physiology pathway) - Outline management of common arrhythmias (e.g. AT/VT)

MO8 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - Know and apply the abbreviations and units used in Respiratory and Sleep Science

MO9 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - Explain the concept of "normal" and the calculation, use and limitations of reference values, reference ranges, Lower Limits of Normal (LLN) and standardized residuals

MO10 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - Explain the normal physiological variability in humans in a range of tests from birth to old age

MO11 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - 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

MO12 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - Explain the need for calibration and quality assurance for all measurements undertaken in Respiratory and Sleep Science

MO13 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - Explain the application of dynamic lung volumes and flows in routine clinical practice and analyse data

MO14 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - Compare different techniques to estimate lung volumes and the limitations of each technique

MO15 Respiratory and Sleep Physiology A (Respiratory and Sleep Physiology pathway) - Discuss the role and application of inhaled drug therapy (Bronchodilators) in the management of respiratory disease

MO16 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

MO17 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) -Explain cellular, tissue and systems responses to diseases of the Cardiac, Vascular and Respiratory systems

MO18 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) -Describe the basis of common infections of the Cardiac, Vascular and Respiratory systems

MO19 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Describe common diseases that affect the Cardiac, Vascular, Respiratory and Sleep Physiology

MO20 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Describe treatment strategies for Cardiovascular and respiratory system disorders

MO21 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Gain an awareness of primary and secondary disorders

MO22 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Discuss the effects of amplifier Characteristics on the quality of the recorded signal, and their influence on recording methodology

MO23 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Discuss the operation, specification, advantages and limitations of filters

MO24 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Outline the principles of signal digitisation

MO25 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Explore the methods and applications of computer acquisition, storage, and analysis of signals in clinical physiology

MO26 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Explain the principles and methods of electrophysiological measurement

MO27 Pathophysiology of CVRS and physiological measurement (All pathways expect Neurophysiology) - Investigate principles and applications of biomedical imaging techniques

MO28 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Recall the normal structure and function of the brain and spinal cord

MO29 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Explain the epidemiology of commonly referred pathophysiology to clinical neurophysiology services

MO30 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Describe the types of genetic error responsible for common abnormalities affecting the brain and spinal cord

MO31 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Discuss the immunological basis of diseases, with particular emphasis on conditions in patients commonly referred to clinical neurophysiology

MO32 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Describe major abnormalities of physiological control mechanisms in diseases of the brain and spinal cord

MO33 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Describe cellular, tissue and systems responses to diseases of the brain and spinal cord, e.g. brain haemorrhage, cerebral infarction, brain tumours and dementia

MO34 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Describe the basis of common infections of the brain and spinal cord, e.g. meningitis, encephalitis, brain abscess

MO35 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - 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

MO36 Applied Neurophysiology and pathophysiology (Neurophysiology pathway) - Discuss the principle non-pharmaceutical treatments relevant to patients commonly referred to clinical neurophysiology to include diet, surgery and cognitive behavioural therapy

MO37 Measurement Techniques - Discuss the effects of amplifier characteristics on the quality of the recorded signal,and their influence on recording methodology

MO38 Measurement Techniques - Discuss the operation, specification, advantages and limitations of filters

MO39 Measurement Techniques - Outline the principles of signal digitisation

MO40 Measurement Techniques - Explore the methods and applications of computer acquisition, storage, and analysis of signals in clinical physiology

MO41 Measurement Techniques - Explain the principles and methods of electrophysiological measurement

MO42 Measurement Techniques - Explain the principles and methods of psychophysical measurement

MO43 Measurement Techniques - Investigate principles and applications of biomedical imaging techniques

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/usskl9-30-2.html

Part 4: Assessment

Assessment strategy: The assessments within this module have been designed to show that the apprentice has developed the required knowledge and clinical skills required to practice as a cardiac physiologist, respiratory and sleep physiologist or neurophysiologist, as appropriate.

Assessment 1: Presentation
The first element will be an independent case study of direct relevance to the apprentice's employment, which is to be prepared and presented for assessment as an oral presentation.

Assessment 2: Written Assignment
The second assessment is a contextual review of a recent article related to diagnostic advance(s) in a technique(s) of relevance to the apprentice's employment, the content of which will be negotiated with the appropriate academic tutor.

Assessment 3: Set Exercise
The set exercise will provide apprentices with an opportunity to demonstrate their knowledge on a broad range of topics. It will assess the apprentices' ability to research relevant information and provide critical thinking in a variety workplace scenarios where the application of knowledge is required.

Formative feedback is available to students throughout the module through group discussions, and in workshops. Apprentices are provided with formative feed-forward for their set exercise through a revision and preparation session.

Assessment tasks:

Presentation (First Sit)
Description: Case study oral presentation (15 minutes)
Weighting: 25 %
Final assessment: No
Group work: No

Learning outcomes tested: MO1, MO10, MO12, MO13, MO14, MO16, MO17, MO18, MO19, MO2, MO20, MO21, MO31, MO32, MO33, MO35, MO36

Written Assignment (First Sit)

Description: Short contextual review (1000 words)

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO13, MO16, MO26, MO41, MO42, MO5

Set Exercise (First Sit)

Description: Set Exercise

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO10, MO11, MO12, MO13, MO14, MO15, MO16, MO17, MO18, MO19, MO2, MO20, MO21, MO22, MO23, MO24, MO25, MO26, MO27, MO28, MO29, MO3, MO30, MO31, MO32, MO33, MO34, MO35, MO36, MO37, MO38, MO39, MO4, MO40, MO41, MO42, MO43, MO5, MO6, MO7, MO8, MO9

Presentation (Resit)

Description: Case study oral presentation (15 minutes)

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO10, MO12, MO13, MO14, MO16, MO17, MO18, MO19, MO2, MO20, MO21, MO31, MO32, MO33, MO35, MO36

Written Assignment (Resit)

Description: Short contextual review (1000 words)

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO13, MO16, MO26, MO41, MO42, MO5

Set Exercise (Resit)

Description: Set Exercise

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO10, MO11, MO12, MO13, MO14, MO15, MO16, MO17, MO18, MO19, MO2, MO20, MO21, MO22, MO23, MO24, MO25, MO26, MO27, MO28, MO29, MO3, MO30, MO31, MO32, MO33, MO34, MO35, MO36, MO37, MO38, MO39, MO4, MO40, MO41, MO42, MO43, MO5, MO6, MO7, MO8, MO9

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Healthcare Science (Neurophysiology) {Apprenticeship-UWE} [Frenchay] BSc (Hons) 2022-23

Healthcare Science (Respiratory & Sleep Physiology) {Apprenticeship-UWE} [Frenchay] BSc (Hons) 2022-23

Healthcare Science (Cardiac Physiology) {Apprenticeship-UWE} [Frenchay] BSc (Hons) 2022-23