



Module Specification

Scientific Basis of Life

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Part 1: Information

Module title: Scientific Basis of Life

Module code: USSJT5-30-1

Level: Level 4

For implementation from: 2020-21

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Health & Applied Sciences

Department: HAS Dept of Applied Sciences

Partner institutions: None

Delivery locations: Frenchay Campus

Field: Applied Sciences

Module type: Standard

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: See Learning Outcomes.

Outline syllabus: This module provides the learner with essential knowledge and understanding of the scientific basis of life.

Biological chemistry: The properties and structures of biochemical building blocks and macromolecules. Acids and bases, simple buffer systems.

Structure and function of eukaryotic cells and their organelles: Membrane structure and transport across membranes via diffusion, carrier proteins, channels, active transport.

Key techniques in Cell Biology and Biochemistry: Light microscopy, confocal microscopy, the transmission electron microscope (TEM), the scanning electron microscope (SEM). Fractionation of cells and their contents, simple protein purification, separation and assay.

Introduction to metabolism: An overview of catabolic and anabolic pathways. The metabolic roles of ATP, NADH, NADPH and FADH₂. Electron transport and ATP synthesis. The major pathways of carbohydrate, lipid and amino acid metabolism and their significance in health and disease. Enzymes as biological catalysts. Determination and significance of K_m and V_{max} , specific activity.

Studying genes: Genetics in context - genes, expectations and realities. The genetic material and genomes. DNA photocopying - the replication of DNA. Decoding the messages within the genes - gene expression: transcription, RNA processing and translation. Altering the genetic material - mutation, recombination, gene cloning and PCR.

Inheriting genes: What Mendel discovered and how molecular genetics relates to Mendel. Variation upon a Mendelian theme. The phenomenon of linkage - mapping genes. Gene inheritance patterns in humans and molecular approaches to diagnosing genetic disease.

Part 3: Teaching and learning methods

Teaching and learning methods: The strategy of this module is to provide a platform for students to gain an understanding of the scientific basis of life.

Students are expected to spend 72 hours on scheduled learning and 228 hours on independent learning. 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, B2), 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. Scheduled sessions may vary slightly depending on the module choices you make.

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 6 hours per block (a total of 18 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 54 hours of online engagement through a combination of lectures, synchronous online tutorials, synchronous and asynchronous discussions, online quizzes, and collaborative group work.

Module Learning outcomes:

MO1 Compare the ultrastructure and function of prokaryotic and eukaryotic cells and their organelles

MO2 Describe the structure of biological membranes and explain key concepts in membrane transport

MO3 Describe the key features and properties of nucleic acids, amino acids, proteins, lipids and carbohydrates

MO4 Describe key pathways in carbohydrate, lipid and amino acid metabolism and explain how energy from metabolism is channelled into ATP synthesis

MO5 Relate DNA and RNA structure to function and describe the basic features of gene structure and expression

MO6 Explain how genetic material can be altered by natural and artificial means

MO7 Describe the modes of inheritance of characteristics

MO8 Demonstrate key skills of data analysis in cell biology, genetics and biochemistry

MO9 Discuss current applications and impact of cell biology, genetics and biochemistry

MO10 Reflect on how the scientific principles of cell biology, biochemistry and genetics underpin practice in healthcare science

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](https://uwe.rl.talis.com/modules/ussjt5-30-1.html) via the following link <https://uwe.rl.talis.com/modules/ussjt5-30-1.html>

Part 4: Assessment

Assessment strategy: The Assessment Strategy has been designed to support and enhance the development of both subject-based and more general skills, whilst ensuring that the modules learning outcomes are attained, as described below.

Component A

The online exams (24 hour window for submission) will provide students with an opportunity to demonstrate both their knowledge on a broad range of topics through a series of short answer questions, and more in-depth knowledge through a selection of medium length questions.

Component B

The first coursework element will provide an opportunity for students to consolidate factual knowledge through data interpretation in Cell Biology, Biochemistry and Genetics. The second element allows students to apply their knowledge and identify examples of how the principles of Cell Biology, Biochemistry and Genetics underpin practice in Healthcare Science through preparation and defence of a poster.

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.

All work is marked in line with the Department'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.

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/summativeassessments.asp>).

Assessment components:

Presentation - Component B (First Sit)

Description: Poster presentation and defence (20 minutes)

Weighting: 30 %

Final assessment: No

Group work: No

Learning outcomes tested: MO10, MO6, MO9

Examination (Online) - Component A (First Sit)

Description: Online Examination (72 hours)

Weighting: 20 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO9

Examination (Online) - Component A (First Sit)

Description: Online Examination (24 hours)

Weighting: 20 %

Final assessment: No

Group work: No

Learning outcomes tested: MO5, MO6, MO7

Case Study - Component B (First Sit)

Description: Data interpretation exercise and case study

Weighting: 30 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO7, MO8

Examination (Online) - Component A (Resit)

Description: Online Examination (24 hours)

Weighting: 40 %

Final assessment: Yes

Group work: No

Learning outcomes tested:

Case Study - Component B (Resit)

Description: Data interpretation exercise and case study

Weighting: 60 %

Final assessment: No

Group work: No

Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Healthcare Science (Cardiac Physiology) {Apprenticeship-UWE}

[Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21

Healthcare Science (Respiratory & Sleep Physiology) {Apprenticeship-UWE}

[Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21

Healthcare Science (Neurophysiology) {Apprenticeship-UWE}

[Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21