



Module Specification

Cells, Biochemistry and Genetics

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Part 1: Information

Module title: Cells, Biochemistry and Genetics

Module code: USSKA4-30-1

Level: Level 4

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: None

Excluded combinations: Scientific Basis of Life *NO LONGER RUNNING* 2023-24

Co-requisites: None

Continuing professional development: Yes

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: This module aims to introduce you to the cell and molecular biology that underpins the rest of your course:

Cell Biology:

Cells are the basic units of all living organisms. They exist in a wide range of forms to occupy different niches as free-living organisms or to carry out diverse roles within multi-cellular organisms. This module focuses on the eukaryotic cells that make up multicellular organisms, although some of the contrasts between eukaryotes and prokaryotes will be mentioned.

Biochemistry:

This module will introduce the organelles and molecules that form the major components of cells and the biochemical pathways that take place within them. We will also consider how cells, organelles and biochemical pathways are studied experimentally.

Genetics:

Genetics is the study of inheritance, genes and the DNA molecules that make up the genetic material. In this module you will study the structure and function of DNA, genes, chromosomes and the genome, as well as the principles of inheritance.

Outline syllabus: 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. Enzymes as biological catalysts. Electron transport and ATP synthesis. The major pathways of carbohydrate and lipid metabolism and their significance in health and disease.

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. Prokaryotic versus eukaryotic gene expression and protein synthesis. Epigenetics in Health and Disease.

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: See Assessment

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

MO1 Describe the ultrastructure and function of eukaryotic cells, organelles and biological membranes

MO2 Describe the key features and properties of nucleic acids, amino acids, proteins, lipids and carbohydrates

MO3 Describe key pathways in carbohydrate and lipid metabolism and explain how energy from metabolism is channelled into ATP synthesis

MO4 Relate DNA and RNA structure to function and describe the basic features of gene structure and expression

MO5 Explain how genetic material can be altered by natural and artificial means

MO6 Describe the modes of inheritance of characteristics

MO7 Demonstrate key skills of data analysis in cell biology, genetics and biochemistry

MO8 Discuss current applications and impact of cell biology, genetics and biochemistry

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 234 hours

Face-to-face learning = 66 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/usska4-30-1.html) via the following link <https://uwe.rl.talis.com/modules/usska4-30-1.html>

Part 4: Assessment

Assessment strategy: The assessment strategy for this module is designed to test the breadth and depth of students' knowledge, as well as their ability to analyse data and relate subject knowledge to current applications and impact.

Assessment 1 is a written assignment, which will provide experience in interpreting and presenting data in Cell Biology, Genetics and Biochemistry. The use of short word limits develops skills in concise scientific writing and helps reduce plagiarism. Plagiarism is also reduced by requiring students to present group data. This feeds forward to assignments at level 2 in Biological Sciences and Biomedical Science programmes.

Assessment 2, running throughout the year, will assess engagement with the practical classes and comprehension of key concepts through a series of online quizzes. Plagiarism is reduced by making use of banks of similar questions assigned randomly.

Assessment 3 is a 3 hour exam.

Opportunities for formative assessment and feedback are built into the assignments.

Assessment tasks:**Written Assignment (First Sit)**

Description: Interpretation and presentation of data

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO7, MO8

Online Assignment (First Sit)

Description: Online practical quizzes

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Examination (First Sit)

Description: 3 Hour Exam

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7, MO8

Written Assignment (Resit)

Description: Interpretation and presentation of data

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO7, MO8

Online Assignment (Resit)

Description: Online practical quizzes

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Examination (Resit)

Description: 3 Hour Exam

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7, MO8

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Biological Sciences [Frenchay] MSci 2023-24

Applied Biomedical Science [Frenchay] BSc (Hons) 2023-24

Biological Sciences [Frenchay] BSc (Hons) 2023-24

Biomedical Science [Frenchay] BSc (Hons) 2023-24

Biomedical Science [Frenchay] MSci 2023-24

Biological Sciences {Foundation} [Frenchay] MSci 2022-23

Biomedical Science {Foundation} [Frenchay] MSci 2022-23

Biomedical Science {Foundation} [Frenchay] BSc (Hons) 2022-23

Biological Sciences {Foundation} [Frenchay] BSc (Hons) 2022-23

Biomedical Science [Frenchay] BSc (Hons) 2023-24

Biomedical Science [Frenchay] MSci 2023-24

Biomedical Science [Frenchay] MSci 2022-23

Biomedical Science [Frenchay] BSc (Hons) 2022-23