



## **Module Specification**

### Cells, Biochemistry and Genetics

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#### **Contents**

|  |          |
|--|----------|
| <b>Module Specification .....</b>                  | <b>1</b> |
| <b>Part 1: Information .....</b>                   | <b>2</b> |
| <b>Part 2: Description .....</b>                   | <b>2</b> |
| <b>Part 3: Teaching and learning methods .....</b> | <b>4</b> |
| <b>Part 4: Assessment.....</b>                     | <b>5</b> |
| <b>Part 5: Contributes towards .....</b>           | <b>7</b> |

## Part 1: Information

**Module title:** Cells, Biochemistry and Genetics

**Module code:** USSKA4-30-1

**Level:** Level 4

**For implementation from:** 2022-23

**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:** Scientific Basis of Life 2022-23

**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 FADH<sub>2</sub>. 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.

Component A consists of 2 exams. The first is 1 hour and tests key concepts delivered in semester 1 . There will thus be an opportunity to receive feedback before the second (2 hours), which will test breadth of knowledge across the module.

Component B1 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. Component B2, 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.

Opportunities for formative assessment and feedback are built into the assignments and review of the January exam.

All work is marked in line with the Department's Generic Assessment Criteria and conforms to the university policies for the setting, collection, marking and return of student work. Assessments are described in the Module handbook that is supplied at the start of module.

**Assessment components:**

**Examination - Component A (First Sit)**

Description: 1 Hour Exam

Weighting: 15 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

**Examination - Component A (First Sit)**

Description: 2 Hour Exam

Weighting: 35 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO3, MO4, MO5, MO6, MO8

**Set Exercise - Component B (First Sit)**

Description: Interpretation and presentation of data

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO4, MO7

**Portfolio - Component B (First Sit)**

Description: Online practical quizzes

Weighting: 25 %

Final assessment: No

Group work: No

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

**Examination - Component A (Resit)**

Description: 3 Hour Exam

Weighting: 50 %

Final assessment: Yes

Group work: No

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

**Online Assignment - Component B (Resit)**

Description: Online practical quizzes

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested:

**Set Exercise - Component B (Resit)**

Description: Interpretation and presentation of data

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested:

**Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Biological Sciences [Frenchay] MSci 2022-23

Biomedical Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2022-23

Biomedical Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2022-23

Biomedical Science [Sep][SW][Frenchay][5yrs] MSci 2022-23

Biomedical Science [Sep][FT][Frenchay][4yrs] MSci 2022-23

Biological Sciences [Sep][FT][Frenchay][3yrs] BSc (Hons) 2022-23

Biological Sciences [Sep][SW][Frenchay][4yrs] BSc (Hons) 2022-23

Applied Biomedical Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2022-23

Healthcare Science (Genetic Science) [Sep][FT][Frenchay][3yrs] BSc (Hons) 2022-23

Healthcare Science (Infection Science) [Sep][FT][Frenchay][3yrs] BSc (Hons) 2022-23

Healthcare Science (Blood Science) [Sep][FT][Frenchay][3yrs] BSc (Hons) 2022-23

Healthcare Science (Tissue Science) [Sep][FT][Frenchay][3yrs] BSc (Hons) 2022-23

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

Biological Sciences [Sep][FT][Frenchay][4yrs] MSci 2022-23

Biological Sciences [Sep][SW][Frenchay][5yrs] MSci 2022-23

Biomedical Science {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2021-22

Biomedical Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Biomedical Science {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2021-22

Biomedical Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2021-22

Biological Sciences {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Biological Sciences {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2021-22

Healthcare Science (Blood Science) {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Healthcare Science (Infection Science) {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Healthcare Science (Tissue Science) {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Healthcare Science (Genetic Science) {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Biological Sciences {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2021-22

Biological Sciences {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2021-22

Biomedical Science [Sep][PT][Frenchay][6yrs] BSc (Hons) 2022-23

Biomedical Science [Sep][PT][Frenchay][8yrs] MSci 2022-23

Biomedical Science [Sep][PT][Frenchay][6yrs] BSc (Hons) 2021-22

Biomedical Science [Sep][PT][Frenchay][8yrs] MSci 2021-22