

Module specification

When printed this becomes an uncontrolled document. Please access the **Module Directory** for the most up to date version by clicking on the following link: **Module directory**

Module code	SCI547
Module title	Cell and Molecular Biology
Level	5
Credit value	20
Faculty	FAST
HECoS Code	100345
Cost Code	GAFS

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BSc (Hons) Biochemistry	Core
BSc (Hons) Biomedical Science	Core
BSc (Hons) Forensic Science	Option
BSc (Hons) Forensic Science with Placement Year	Option

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	30 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	30 hrs
Placement / work based learning	170 hrs
Guided independent study	0 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	14/10/2020
With effect from date	01/09/2022
Date and details of revision	21/04/2021 Addition of BSc Biomedical Science 10/05/2023 AB approval of BSc (Hons) Forensic Science revalidation (module update)
Version number	3

Module aims

The module aims to develop further knowledge and understanding of cell and molecular biology that builds on the anatomy, physiology and cell biology learnt at Level 4. It starts with the chemical components of living cells, macromolecules and cell structures and organelles. The essential functions of the cell including metabolism, DNA replication, gene expression and genetic variability. How a complex of cells can form a tissue is examined. Finally, molecular biology is explored in depth – with the aim of developing an appreciation of techniques and topics such as polymorphic markers, genetic disease, genotyping and genomics.

Module Learning Outcomes- at the end of this module, students will be able to:

1	Explain and analyse the structure and functions of cellular macromolecules, such as proteins, carbohydrates, lipids and nucleic acids.
2	Explain and analyse key concepts of cellular biochemistry, metabolism and molecular biology.
3	Evaluate the functions of the cell, organelles and the development of tissues.
4	Analyse the central dogma of DNA → RNA → Protein and its relationship to gene mutations and cellular disease.
5	Evaluate molecular biology techniques, such as polymorphic markers, restriction enzymes, genetic markers of disease and gel electrophoresis.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook

Assessment 1: Exam (2 Hours)

The assessment will take the form of online exam questions but will utilise continuous formative assessment to test in-depth knowledge, analysis, evaluation and interpretation of the complexities of molecular and cellular biology, evaluating facts and concepts of the subjects under study. The 2 hour exam will consist of multiple choice and analysis questions drawn from the syllabus below.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1-5	Examination	100%

Derogations

For Biomedical Science students only:

This module must be passed at or above 40%. Compensation for failure is not permitted for this module and other “core” biomedical science modules across the programme.

Learning and Teaching Strategies

Strategies used in this module will involve flipped classroom, scale-up methodologies and lead lectures, seminars, tutorials, case studies and student-led presentations.

Indicative Syllabus Outline

- Cell structure and chemical components of cells, including structure and function of macromolecules.
- Cell functions – cell membrane, organelles, transport and signaling.
- Metabolism – energy (ATP production), catalysis, oxidation and reduction, and enzyme kinetics.
- Proteins – structure and function, monoclonal and polyclonal antibodies, ELISAs, electrophoresis and western blotting..
- Gene expression – transcription switches, repressors and activators, initiation, distance control, combinatorial control.
- Molecular biology – isolating cells and culture, restriction enzymes, electrophoresis, nucleotide sequences. Polymorphic markers, gene frequencies, DNA cloning, ligase, plasmids, cDNA libraries, PCR, sequencing and DNA engineering.
- Genetic markers of disease and kinship.
- Processes for ensuring the quality and validity of results

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

Alberts, B., Hopkin, K., Johnson, A., Morgan, D., Roberts, K., Walter, P. & Heald, R. (2023), *Essential Cell Biology*, 6th Edition, New York, USA, WW Norton & Co.

Other indicative reading

Alberts, B., Heald, R., Johnson, A., Morgan, D., Raff, M., Roberts, K., Walter, P., Wilson, J. & Hunt, T. (2022), *Molecular Biology of the Cell*, 7th Edition, New York, USA, WW Norton & Co.

Berg, J., Gatto Jr, G., Hines, J., Tymoczko, J. & Stryer, L. (2023), *Biochemistry*, 10th Edition, New York, USA, Macmillan.

Krebs, J., Goldstein, E. & Kilpatrick, S. (2018), *Lewin's Genes XII*, 12th Edition, Sudbury, USA, Jones & Bartlett.

Reed, R., Holmes, D., Weyers, J. & Jones, A. (2021), *Practical Skills in Biomolecular Science*. 6th Edition, London, UK, Pearson.

A number of online resources provide high-quality material, for example the National Center for Biotechnology Information or the DNA learning Center at the Cold Spring Harbor Laboratory. For example, [Molecular Biology of the Cell \(4th edition\)](#) is available free online.

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas. [Click here to read more about the Glyndwr Graduate attributes](#)

Core Attributes

Engaged
Creative
Enterprising
Ethical

Key Attitudes

Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets

Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Emotional Intelligence
Communication