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BI501		Gene Expression and Its Control				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	I	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Autumn	I	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Autumn	I	15 (7.5)	50% Coursework, 50% Exam	
1	Canterbury	Autumn	I	15 (7.5)	70% Exam, 30% Coursework	

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:

Demonstrate an understanding of how genes are organised, expressed and controlled in both prokaryotes and eukaryotes.
Demonstrate an awareness of the contribution of modern molecular and cellular technologies in furthering our understanding of gene expression and its control.
Demonstrate an appreciation of the importance of fundamental research into gene structure and function for future developments in the fields of human genomics and disease.
Analyse data from laboratory experiments that address issues relating to gene structure and/or expression.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
Extract and interpret information at an intermediate level.
Analyse and evaluate experimental data at an intermediate level.
Have acquired skills in written communication and receiving critique.

Method of Assessment

Assignment 1, word limit 750-1000 words (20%)
Assignment 2, word limit 1500-2000 words (20%)
Exam, 2 hr, (60%)

Preliminary Reading

Core Texts (one of the following):

Krebs, J.E., Goldstein, E.S. and Kilpatrick, S.T. "Lewin's Genes XII", Jones and Bartlett Learning, Publishers, 2018 [ISBN-978-1-284104493]
Krebs, J.E., Goldstein, E.S., Kilpatrick, S.T. "Lewin's Essential Genes 3rd edition" Jones and Bartlett Learning, 2013, [ISBN: 978-1-4496-4479-6]
Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. & Losick, R. "Molecular Biology of the Gene, 7th Edition", Pearson, 2014 [ISBN: 978-0-321-85149-9]

In addition, the following books are recommended for supplementary/background reading:
Craig, N., Cohen-Fix, O., Green, R., Greider, C., Storz, G., Wolberger, C. 'Molecular Biology: Principles of Genome Function', 2nd edition OUP Oxford; 2014, ISBN-13: 978-0198705970
Latchman, D.S. 'Gene Control'. Garland Science, 2014, ISBN-10: 0815365136

Pre-requisites

BIOS3020 Molecular and Cellular Biology

Restrictions

Stage 2 students only

Synopsis *

The module deals with the molecular mechanisms of gene expression and its regulation in organisms ranging from viruses to man. This involves descriptions of how genetic information is stored in DNA and RNA, how that information is decoded by the cell and how this flow of information is controlled in response to changes in environment or developmental stage. Throughout, the mechanisms in prokaryotes and eukaryotes will be compared and contrasted and will touch on the latest developments in how we can analyse gene expression, and what these developments have revealed.

BI503 Cell Biology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	I	15 (7.5)	65% Exam, 35% Coursework	

Availability

It is required that you have taken all the core modules within one of our Bioscience programmes in order to take this module.

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:

Demonstrate an understanding of cellular organisation and associated processes.
Demonstrate an understanding of modern procedures for investigating cellular components.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Access and evaluate scientific literature.
Present a concise digest of a research area both orally and in written form.

Method of Assessment

Presentation on scientific literature, 8 min (10%)
Practical Report, 1000 word limit (25%)
Exam, 2 hr (65%)

Preliminary Reading

Core texts:
Lodish HF, Berk A, Kaiser CA, Krieger M, Molecular cell biology, 8th Edition, W.H. Freeman, 2016

Optional texts:
Alberts B, Molecular Biology of the Cell, 6th Edition, Garland Science Pub., 2015
Alberts B, Essential Cell Biology, 4th Edition, Garland Science Pub., 2014

Much of the module material is covered at some (usually more introductory) level in Biology and Biochemistry textbooks, as recommended in other modules - examples include Campbell's Biology and Nelson & Cox's (Lehninger's) Principles of Biochemistry

Pre-requisites

None

Restrictions

Stage 2 students only

Synopsis *

The cell is the fundamental structural unit in living organisms. Eukaryotic cells are compartmentalized structures that like prokaryotic cells, must perform several vital functions such as energy production, cell division and DNA replication and also must respond to extracellular environmental cues. In multicellular organisms, certain cells have developed modified structures, allowing them to fulfil highly specialised roles. This module reviews the experimental approaches that have been taken to investigate the biology of the cell and highlights the similarities and differences between cells of complex multicellular organisms and microbial cells. Initially the functions of the cytoskeleton and certain cellular compartments, particularly the nucleus, are considered. Later in the unit, the mechanisms by which newly synthesised proteins are secreted or shuttled to their appropriate cellular compartments are examined.

BI505 Infection and Immunity

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	I	15 (7.5)	100% Exam	
2	Canterbury	Spring	I	15 (7.5)	55% Exam, 45% Coursework	

Contact Hours

Total contact hours: 26
Private study hours: 124
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:

The major immune system functions and components, how cell-cell communication controls immune responsiveness to infectious agents and immunopathology.
Microorganisms of medical importance and the diseases they cause.
How the spread of disease occurs in the human population.
Experimental procedures in handling and identifying bacteria in samples provided to the students during the practical class.
Microbiological and immunological techniques used to identify pathogens and immune cells
Methods of data acquisition analysis and presentation as evidenced by the practical report assessment.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:

Interpretation and retrieval of relevant information.
Analysis and evaluation of data.
Written communication skills.

Method of Assessment

Immunology assessment, 1500 words (22.5%)
Lab Practical Report (22.5%)
Examination, 2 hr (55%)

Preliminary Reading

Murphy, K., Janeway's Immunobiology, 9th Edition, Garland Science, 2017
Owen, Punt and Stranford, Kuby Immunology, 8th Edition, Macmillan, 2019
Mims' Medical Microbiology, 6th Edition, Mosby, 2019

Pre-requisites

BIOS3070 Human Physiology and Disease I

Restrictions

Stage 2 students only

Synopsis *

This module will consider the anatomy and function of the immune system and immunopathology and then consider the diseases and microorganisms that affect the different organs and tissues of the human body. Indicative topics will include inflammation, innate and adaptive immunity to pathogens, immune defence mechanisms against bacterial, viral and parasitic infections, antibody classes and functions, antigen processing and presentation, complement, the generation of antibody diversity, cell communication and immunopathology, including autoimmunity, hypersensitivity and transplant rejection. In the medical microbiology section of the module, indicative topics will include epidemiology, virology, parasitology, fungal infections, skin infections, GI tract infections, CNS infections, respiratory tract infections, UTI and STD infections.

BI513 Human Physiology and Disease 2

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	I	15 (7.5)	60% Exam, 40% Coursework	
2	Canterbury	Autumn	I	15 (7.5)	65% Exam, 35% Coursework	

Contact Hours

Total Contact Hours: 24
Private Study Hours: 126
Total Study Hours: 150

Learning Outcomes

1. Describe the structural organisation and function of specific physiological systems of the body and understand how the body systems act in an integrated manner to maintain homeostasis.
2. Describe how malfunction of physiological systems gives rise to disease, using specific examples.
3. Appreciate the relationship between physiology, anatomy, and medicine.

Method of Assessment

• In-Course Test (90 minutes) – 35%
• Examination (2 hours) – 65%

Preliminary Reading

Silverthorn, D.U. (2018). Human Physiology – An Integrated Approach, 8th Edition. New York, NY: Pearson Education.

Restrictions

Not available as an elective module choice.

Synopsis *

This module will consider the anatomy and function of normal tissues, organs and systems and then describe their major pathophysiological conditions. It will consider the aetiology of the condition, its biochemistry and its manifestation at the level of cells, tissues and the whole patient. It may also cover the diagnosis and treatment of the disease condition. Indicative topics will include the reproductive system; muscle; nervous system; and endocrine system.

BI514 Pharmacology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	I	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Spring	I	15 (7.5)	60% Exam, 40% Coursework	

Availability

It is required that you have taken all the core modules within stage 1 of one of our Bioscience programmes in order to take this module. It is also recommended that you have taken BI307 Human Physiology and Disease.

Contact Hours

Total contact hours: 29
Private study hours: 121
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate a critical understanding of receptors, ion channels, enzymes and carrier molecules as drug targets.
Describe drug-receptor interactions at the molecular level.
Demonstrate a critical understanding of systems pharmacology – e.g. cardiovascular and central nervous systems – and the action of therapeutic agents in diseased states.
Demonstrate theoretical and applied knowledge of pharmacological techniques.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Extract and interpret information at an intermediate level.
Analyse and evaluate data at an intermediate level.
Have acquired skills in written communication and receiving critique.
Have acquired skills in working as a team to solve problems.

Method of Assessment

Data analysis (one problem question and five short answer questions) – 20%
In-class clinical case study (3 hours) – 20%
Examination (2 hours) – 60%

Preliminary Reading

Neal MJ, Medical Pharmacology at a Glance, 8th Edition, Blackwell Pub., 2015
Rang and Dale's Pharmacology, 8th Edition, Churchill Livingstone, 2015

Pre-requisites

BIOS3070 Human Physiology and Disease

Restrictions

Stage 2 students only

Synopsis *

Introduction and basic principles of drug action: key drug targets including major receptor subtypes, ion channels, transporters, and structure-function relationships
Systems pharmacology: the biological basis of diseases states affecting different physiological systems, therapeutic approaches to treating these diseases, and the cellular/molecular mode of action of drugs used. Indicative diseases may include hypertension, asthma, Parkinson's disease, schizophrenia, infertility, depression and anxiety.

BI520 Metabolism and Metabolic Disease

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	I	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Autumn	I	15 (7.5)	100% Coursework	
1	Canterbury	Autumn	I	15 (7.5)	70% Exam, 30% Coursework	

Availability

It is recommended that you have taken core Stage 1 modules in Biochemistry or Biomedical Sciences

Contact Hours

Total Contact Hours: 23
Total Private Study Hours: 127
Total Study Hours: 150

Learning Outcomes

The intended subject specific learning outcomes.On successfully completing the module students will be able to:
Demonstrate critical understanding of selected mechanisms that can lead to human metabolic diseases, and their genetic basis.
Recall metabolic maps that relate the main pathways of catabolism and biosynthesis to each other.
Demonstrate significant understanding about how metabolic pathways interact with each other, including those in different tissues.
Demonstrate critical understanding of selected chemical mechanisms that underpin the metabolism studied.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Communicate effectively and confidently using a variety of methods.
Analyse data relating to metabolic defects and report results.
Solve complex problems.

Method of Assessment

Computer Practical Report (2,000 words) – 30%
Examination (2 hours) – 70%

The examination is a compulsory sub-element and must be passed to complete the module

Preliminary Reading

Clarke, Joe T. R., (2010). A Clinical Guide to Inherited Metabolic Diseases. 3rd Edition Cambridge: Cambridge University Press.
Nelson DL, Lehninger Principles of Biochemistry. Editions 5 – 7.
Newsholme, E. and Leech, A. (2009). Functional Biochemistry in Health and Disease. Chichester: Wiley.
Osgood M., Ocorr K.A., (2012). The Absolute, Ultimate Guide to Lehninger Principles of Biochemistry: Study Guide and Solutions Manual, 6th edition, New York: W.H. Freeman.

Pre-requisites

None

Restrictions

Stage 2 students only

Synopsis *

This module covers the general principles of metabolic disorders and focuses on pathways, enzyme mechanisms, and diseases associated with defects in metabolism.

BI521 Metabolism and Metabolic Regulation

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	I	15 (7.5)	70% Exam, 30% Coursework	
1	Canterbury	Spring	I	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Total Contact Hours: 24
Total Private Study Hours: 126
Total Study Hours: 150

Learning Outcomes

1. Understand key modes of metabolic regulation.
2. Understand key elements of plant and microbial metabolism that are distinct from human metabolism covered elsewhere.
3. Understand the importance of metabolic processes in biotechnological applications.

Method of Assessment

• Practical report (2,000 words) – 30%
• Examination (2 Hours) – 70%

Preliminary Reading

* Garrett R.H. (2017). Biochemistry (Sixth Edition). Boston, MS: Cenage Learning.
* Nelson D.L., Cox, M.M., and Lehninger A.L. (2017). Lehninger Principles of Biochemistry. (Seventh Edition). New York: W.H. Freeman.

Pre-requisites

Co-requisite: BIOS5200 – Metabolism and Metabolic Disease

Synopsis *

This module will cover the following areas:

* Principles of metabolic regulation: Allostery, cooperativity, phosphorylation, and hormonal control. Metabolic regulation in response to cellular energy status. Transcriptional regulation.
* Plant metabolism: Photosynthesis and carbon fixation.
* Microbial metabolism: Nitrogen metabolism, stress responses, metals, and secondary metabolites.
* Metabolism in biotechnology: Manipulating microbial metabolism for the production of useful compounds. Manipulating mammalian cell metabolism in biotechnology.

BI525 Investigation of Disease

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	I	15 (7.5)	100% Coursework	
2	Canterbury	Autumn	I	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Total Contact Hours: 31
Total Private Study Hours: 119
Total Study Hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate a cogent understanding of the working practices in the United Kingdom National Health Service and the role of a Biomedical Scientist.
Demonstrate critical knowledge and understanding of the general techniques used in Clinical Biochemistry and their use in the assessment of disease.
Demonstrate significant knowledge and understanding of the general techniques used in Cellular Pathology and application to the assessment of disease and potential treatment strategies.

The intended generic learning outcomes.On successfully completing the module students will be able to:
Demonstrate assertiveness when interpreting and retrieving information.
Demonstrate the ability to generate, interpret, analyse and evaluate data
Demonstrate the ability to communicate effectively to a varied audience.
Demonstrate confident practical skills in selected diagnostic pathology laboratory techniques.

Method of Assessment

Practical Report (1,500 words) – 40%
Examination (2 hours) – 60%
Both the Practical Report and the examination are compulsory sub-elements and must be passed to complete the module.

Preliminary Reading

Ahmed, N., (2016). Clinical Biochemistry, Second Edition, Fundamentals of Biomedical Science Series, Oxford: Oxford University Press.
Murphy M.J, Srivastava R et al (2018). Clinical Biochemistry, Sixth Edition, Churchill Livingstone, London.
Orchard, G. and Nation, B., (2017). Histopathology, Second Edition, Fundamentals of Biomedical Science Series, Oxford: Oxford University Press.
Shambyati, B., (2018). Cytopathology, Second Edition, Fundamentals of Biomedical Science series, Oxford: Oxford University Press.

Pre-requisites

None

Restrictions

Stage 2 students only

Synopsis *

This module introduces students to clinical biochemistry and cellular pathology, and molecular pathology.
Students learn about the principles of and procedures for a wide variety of techniques employed in modern laboratory medicine. Students practice integration and practical application of this knowledge throughout the module using diagnostic case study analyses. The clinical biochemistry section is organised anatomically. The cellular and molecular pathology section is organised according to laboratory medicine specialities, with particular emphasis placed on the detection and diagnosis of cancer in the NHS. Quality assurance, governance and regulatory systems relevant to UK laboratory medicine are introduced.

BI532 Skills for Bioscientists 2

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	I	15 (7.5)	100% Coursework	

Contact Hours

Total contact hours: 60
Private study hours: 90
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate knowledge and understanding of general techniques in spectroscopy, chromatography, electrophoresis and immunochemistry.
Demonstrate an understanding and ability to use DNA databases and phylogenetic trees.
Plan and execute experimental work using a range of experimental techniques.
Report experimental work both orally and written.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate basic computer skills for use in bioinformatics and data retrieval.
Demonstrate communication skills in scientific reporting (essay writing, oral presentations and laboratory reports) and in working with others (group work).

Method of Assessment

Essay analysis (15%) (group assignment)
Presentation (25%) (5 min individual contribution to 20 min group presentation)
Mini-project report (55%) (2500 words)
Bioinformatics assignment (5%)

Preliminary Reading

Reed, R, Holmes, D., Weyers, J. and Jones, A. Practical Skills in Biomolecular Sciences 4th edition (2013) Prentice Hall
Price, N.C. and Nairn, J. Exploring Proteins – A Student's Guide to Experimental Skills and Methods (2009) Oxford University Press
Johnson, S. & Scott, J, Study and Communications Skills for the Biosciences (2009) Oxford University Press

Pre-requisites

BIOS3000 Introduction to Biochemistry
BIOS3080 Skills for Bioscientists

Restrictions

Stage 2 students only

Synopsis *

Communication Skills in Biosciences: Essay writing, oral presentations, laboratory reports, the scientific literature and literature reviews. Working in groups.

Techniques in Biomolecular Science: Immunochemistry. Monoclonal and polyclonal antibody production, immuno-chromatography, ELISA and RIA. Electrophoresis, Immunoblotting, Protein Determination, Activity Assays, Purification.

Computing for Biologists: Bioinformatics, phylogenetic trees, database searches for protein/DNA sequences.

Mini-project – introduction to research skills: Students will work in groups of eight to undertake directed experimental work (Group Project) before extending the project further through self-directed experiments working as a pair (Mini Project).

Careers: The programme will be delivered by the Careers Advisory Service and will review the types of careers available for bioscience students. The sessions will incorporate personal skills, careers for bioscience graduates, records of achievement, curriculum vitae preparation, vacation work, postgraduate study, interview skills and action planning.

BI546 Animal Form and Function

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	I	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Autumn	I	15 (7.5)	100% Coursework	

Availability

It is strongly recommended that you have taken the Core stage 1 modules within one of our Bioscience programmes.

Contact Hours

Total contact hours: 31
Private study hours: 119
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Describe body plans and the structural organisation of a range of animals.
Demonstrate an understanding of the physiological role of a range of structures in animals.
Compare physiological systems across the animal kingdom.
Describe how physiological systems adapt to specific environmental conditions.
Demonstrate a practical understanding of classification on the basis of external morphological features in the arthropods.

The intended generic learning outcomes. On successfully completing the module students will be able to:

Analyse and communicate experimental findings.
Demonstrate effective written communication skills.
Integrate information from a variety of sources.

Method of Assessment

Practical report 1 (20%): Word count limit 2500 maximum
Practical report 2 (20%): Word count limit 2000 maximum
Exam, 2 hr (60%)

Preliminary Reading

Hickman, C.P., Roberts, L.S., Keen, S.L., Eisenhour, D.J., Larson, A., L'Anson, H. Integrated Principles of Zoology (17th Ed) (2017)

Pre-requisites

None

Synopsis *

You study the diversity of animal life throughout evolution, including elements of functional anatomy and physiology such as circulation and gaseous exchange, the digestive system, the nervous system and reproduction.

Topics:
A. Comparative physiology - in this section the diversity of different physiological systems will be studied including circulation, gaseous exchange, feeding and digestion, excretion, nervous tissue and the senses, reproduction and immunology.
B. Form and Function - in this section a diverse range of taxonomic groups and their characteristics will be studied to understand the relationship between structure and function. How these characteristics equip the animal to survive and succeed in its particular environment will be explored.

BI547 Plant Physiology and Adaptation

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	I	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Spring	I	15 (7.5)	70% Exam, 30% Coursework	

Contact Hours

Total Contact Hours: 30
Total Private Study Hours: 120
Total Study Hours: 150

Learning Outcomes

1. Demonstrate detailed knowledge of plant specific features of cellular organisation and processes.
2. Demonstrate a cogent understanding of the process and regulation of photosynthesis.
3. Demonstrate a critical understanding of plant hormones and their role in the life cycle and responses to the environment.
4. Demonstrate a detailed understanding of how plants respond and adapt to environmental conditions.

Method of Assessment

• Practical Report (2,000 words) – 30%
• Examination (2 hours) – 70%

Both the practical report and the examination are compulsory sub-elements and must be passed to complete the module

Preliminary Reading

* Hopkins, W.G. and Hunter, N.P.A. (2008). Introduction to Plant Physiology (Fourth Edition). Hoboken, NJ: Wiley Publishing.
* Smith, A.M., Coupland, G., Dolan, L., Harberd, N., Jones, J., Martin, C., Sablowski, R., Amery, A. (2010). Plant Biology, New York: Garland Science.
* Taiz, L., Zeiger, E., Møller, I.M., and Murphy, A. (2018). Plant Physiology and Development (Sixth Edition). Sunderland, MA: Sinauer Associates.

Synopsis *

This module will cover the following areas:

* Plant specific features of cellular organisation and processes – cell wall synthesis, cell division, endoreduplication, plasmadesmata.
* Photosynthesis – mechanism and regulation of photosynthesis, photorespiration, C3, C4 and CAM.
* Plant hormones and signalling – e.g. auxins, gibberellins, cytokinins etc. and their roles in tropism, photoperiodism, and flowering.
* Adaptation and stress response – environmental stress, acclimatisation and adaptation.

BI548 Microbial Physiology and Genetics I

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	I	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Spring	I	15 (7.5)	50% Coursework, 50% Exam	
1	Canterbury	Autumn	I	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total contact hours: 28
Private study hours: 122
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:

Demonstrate knowledge and critical understanding of the ecological, economic and scientific importance of microorganisms.
Demonstrate knowledge and critical understanding of the evolution, taxonomy and biodiversity of microorganisms.
Demonstrate knowledge and critical understanding of the structural and metabolic diversity of microorganisms.
Demonstrate knowledge and critical understanding of the synthesis and assembly of macromolecular structures of microorganisms.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate communication skills in a variety of forms and receiving critique.
Generate, analyse and report experimental data at an intermediate level.
Solve scientific logic and mathematical problems at an intermediate level.

Method of Assessment

Assessed practical - data analysis and write up (2000 word limit) (40%)
Exam, 2 hr (60%)

Preliminary Reading

Brock Biology of Microorganisms (14th Edition) Pearson
Microbiology, An Evolving Science. Slonczewski and Foster (3rd Edition) W.W. Norton and Company

Pre-requisites

Prerequisite: BIOS3240 Genetics and Evolution

Restrictions

Stage 2 students only

Synopsis *

The module deals with the molecular mechanisms underlying the ecological, medical, scientific and commercial importance of microorganisms (including prokaryotic and eukaryotic microorganisms). This involves descriptions of how microbial genetic information is stored in DNA, how that information is decoded by the cell and how this flow of information is controlled in response to changes in environment. The Module also discusses microbial interaction with humans and the environment. Throughout the module, the mechanisms in prokaryotes and eukaryotes will be compared and contrasted and will touch on the latest tool development in microbiology.

BI549 The Genome

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	I	15 (7.5)	100% Coursework	
1	Canterbury	Spring	I	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

27 Contact hours
123 Hours of private study
Total hours for the module: 150 hours

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module, students will be able to demonstrate:
An understanding of the composition and structure of complex eukaryotic genomes
An understanding of how genes and genomes vary between individuals, the origins of this variation, and the modern molecular technologies used to measure genetic and genomic variation
Technical skills in working with DNA and carrying out basic bioinformatics and genomic analysis of nucleotide sequences
An understanding of the information that can be inferred from genomic sequence data, including identification of individuals, assessment of population structure (ethnic background) and phenotype prediction including medically-relevant information
An understanding of the uses to which this information can be put, such as forensic analysis, medical diagnosis and historical research
An understanding of methods of genome editing and the ethical issues surrounding it

The intended generic learning outcomes. On successfully completing the module students will be able to:
Communicate information, arguments and analysis to specialist and non-specialist audiences
Analyse and communicate experimental findings
Understand the limits of their knowledge and how this influences their analyses and interpretations of data

Method of Assessment

Laboratory practical report (1500 words, 25%)
Computer analysis workshop report (1500 words, 25%)
Exam (2 hours, 50%)

Preliminary Reading

Relevant chapters from core undergraduate biology textbooks, e.g. Campbell's Biology
Dudley, J.T. and Karczewski, K.J. (2013) Exploring Personal Genomics, Oxford University Press. ISBN: 9780199644490
Lesk, A. (2017) Introduction to Genomics (3rd edition), Oxford University Press. ISBN: 9780198754831

Additionally selected peer-reviewed research and review papers will be recommended.

Pre-requisites

BIOS3020 (BI302) Molecular & Cellular Biology
BIOS3240 (BI324) Genetics & Evolution

Synopsis *

This module will introduce students to the importance of genome-wide DNA sequence analysis in a range of different fields of study including forensic science, medical diagnosis and historical research. They will acquire a full grounding in the basic biology of how sequence data is acquired and analysed, and engage with up-to-date methods of DNA sequence analysis in the practical sessions. At the broad level, the module will be structured around the following 4 themes:
What is a genome? This addresses genome content and structure, including both functional and non-functional elements of the genome such as the simple "junk" DNA repeats used for forensic identification.

Understanding genomic variation. This addresses the molecular causes of genomic variation between individuals – i.e. what makes us all unique – and the technical methodologies used to detect genomic variation.

What are the implications of being able to read DNA? This covers the extent to which we can infer phenotype from genomic sequence – e.g. how much you can tell about a person once their genome has been sequenced. Specific examples may be drawn from forensic science, medical diagnosis and historical analysis.

What are the implications of being able to write or edit DNA? This addresses nascent and future technology for genome editing – what can it achieve, what are the risks, what are the ethical issues?

BI600 Research Project

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	H	30 (15)	100% Project	

Contact Hours

Total contact hours: 192
Private study hours: 108
Total study hours: 300

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate an in-depth understanding of an advanced research topic within the fields of Biochemistry, Biology, or Biomedical Science through study of the peer-reviewed primary scientific literature.
Appreciate how scientific knowledge advances through research e.g. the timescales, challenges, limitations, impact of technological advances.

Students taking wet/dry (computing-based) laboratory projects will be able to:
Understand how to design and execute a sequence of experiments to address a research question and how to record data.
Enhance their existing and acquire new experimental skills.
Identify and solve practical and theoretical problems.
Show an awareness of the safety implications of laboratory work and knowledge of good laboratory practice (wet lab projects only).

Students taking dissertation/business/communications projects will be able to:
Develop critical analysis skills, design novel experiments to address specific questions within the chosen topic and to appreciate the limitations and the practicability of the experimental process.

Students undertaking business projects will be able to::
Appreciate how scientific research may be translated into business ideas.
Understand the factors that are important in planning and preparing a business plan.

Students taking communication projects will be able to:
Demonstrate an ability to simplify complex scientific information and to adapt it to suit the audience.
Present current scientific research to a general audience making it accessible and interesting.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Appreciate how research leads to knowledge.
Demonstrate a clear and concise style of scientific writing that is both informative and lucid.
Demonstrate skills in the retrieval of scientific information from journals and through electronic searches.
Acquire an understanding of how technologies may be applied/adapted to address a research question.
Develop their abilities to work independently and as part of a team - self-motivation, diplomacy, planning and organisational skills and time management.
Exhibit skills in appraising critically and integrating information.
Show skills in communicating science (oral, written or web formats) and in making and defending scientific arguments.

Method of Assessment

For each project type the project write and performance comprise 90% of the assessment (with different splits depending on the type of the project), with the final 10% assessed by a presentation.
Laboratory reports:
Written Project report – 6000 words maximum 70%
Project Performance – 20%
Presentation (15 minutes) – 10%

Non-laboratory reports (Dissertation and Business):
Written Project report – 11,000 words maximum 80%
Project performance – 10%
Presentation (15 minutes)– 10%

Communication Project:
Written Project report – 6,000 words maximum 60%
Communication element of report – 20%
Project performance – 10%
Presentation (15 minutes)– 10%

Preliminary Reading

Reading is entirely project-specific, to be discussed with academic supervisor.

Pre-requisites

None

Restrictions

Biosciences Stage 3 students only

Synopsis *

Projects are designed by individual members of staff in keeping with their research interests and fall into one of four categories:
• Wet/Dry Laboratory and Computing: practical research undertaken in the teaching laboratories, or on computers followed by preparation of a written report
• Dissertation: library-based research leading to production of a report in the style of a scientific review
• Business: development of a biotechnology business plan
• Communication: similar to dissertation projects but with an emphasis on presenting the scientific topic to a general, non-scientist audience

BI602 Cell Signalling

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	H	15 (7.5)	100% Coursework	
2	Canterbury	Autumn	H	15 (7.5)	60% Exam, 40% Coursework	
2	Canterbury	Autumn	H	15 (7.5)	65% Exam, 35% Coursework	

Availability

It is required that you have taken all the core modules within stage 2 of one of our Bioscience programmes in order to take this module.

Contact Hours

Total Contact Hours: 32
Total Private Study Hours: 118
Total Study Hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate thorough knowledge of the major classes of signalling molecules, their receptors and intracellular signalling pathways.
Demonstrate confident and professional practical and data handling skills associated with monitoring intracellular signalling.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Interpret and retrieve information confidently and accurately.
Analyse and evaluate data with a high degree of accuracy.
Demonstrate effective communication skills.

Method of Assessment

Practical Report (2,000 words) – 35%
Examination (2 hours) – 65%

Preliminary Reading

Hancock JT, Cell Signalling, Fourth Edition. Oxford: Oxford University Press.
Lim, W., Mayer, B., and Pawson, T. (2015). Cell Signalling – Principles and Mechanisms, New York: Garland Science.
Lodish H et al. (2016). Molecular Cell Biology, Eighth Edition. New York: WH Freeman & Co
Nelson, J, (2008). Structure and Function in Cell Signalling, New York: Wiley Blackwell

Pre-requisites

None

Restrictions

Biosciences Stage 3 students only

Synopsis *

The module begins by overviewing the diverse mechanisms used by cells to communicate, considering the main modes of cell-cell communication, the major classes of signalling molecules and the receptor types upon which they act. It then focuses on nuclear, G-protein coupled, and enzyme linked receptors covering in molecular detail these receptors and their associated signal transduction pathways.

BI604 Biological Membranes

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	H	15 (7.5)	65% Exam, 35% Coursework	
1	Canterbury	Spring	H	15 (7.5)	70% Exam, 30% Coursework	
1	Canterbury	Autumn	H	15 (7.5)	70% Exam, 30% Coursework	
1	Canterbury	Autumn	H	15 (7.5)	65% Exam, 35% Coursework	

Contact Hours

Total contact hours: 38
Private study hours: 112
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate an understanding of membrane structure, traffic and transport, and understand the molecular basis of several common genetic diseases in this area.
Demonstrate ability to integrate data from laboratory and computer-based analyses.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate a range of computer skills important to final year projects and to scientific research.
Demonstrate the ability to solve honours level problems using scientific data.

Method of Assessment

Practical (30%) 2500 word limit based on combined computer and wet lab investigation
Exam, 2 hr (70%)

Preliminary Reading

Core texts:
Lehninger Principles of Biochemistry. D.L. Nelson and M. M. Cox. 7th edition, W.H. Freeman (Macmillan), 2017; and Membrane Structural Biology: with Biochemical and Biophysical Foundations. M. Luckey, 2nd edition, Cambridge University Press, 2014
In addition, students will be given references to articles in a number of key review and to primary research papers

Pre-requisites

None

Restrictions

Stage 3 students only

Synopsis *

Cells and subcellular compartments are separated from the external milieu by lipid membranes with protein molecules inserted into the lipid layer. The aim of this module is to develop understanding of both the lipid and protein components of membranes as dynamic structures whose functions are integrated in cellular processes.

BI606 Pathogens & Pathogenicity

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	H	15 (7.5)	65% Exam, 35% Coursework	

Contact Hours

Total contact hours: 20
Private study hours: 130
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate an understanding and knowledge of the molecular basis of microbial pathogenesis in relation to bacterial, viral, parasitic and fungal pathogens.
Comprehend, assimilate and present data and concepts on a pathogenesis-related topic.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate the ability to understand, analyse and assess published scientific data.
Assess presented scientific data and concepts, providing constructive feedback.
Demonstrate written communication skills.

Method of Assessment

Written assessment (2000 - 2500 words): 35%:
Exam (2h): 65%

Preliminary Reading

Mims, CA, The Pathogenesis of Infectious Diseases, 6th ed. (Academic Press, 2015)
Fields, BN, Knipe DM, Howley PM, Fundamental Virology, 5th ed. (Lippincott-Raven, 2007)
Wilson BA, Salyers, AA, Whitt, DD, Bacterial Pathogenesis, A Molecular Approach, 3rd ed. (ASM Press, 2011)
Wilson M, The Human Microbiota in Health and Disease: An Ecological and Community-based Approach, 1st ed. (CRC press, 2018)
NB: The rest of the suggested reading will consist of review articles and primary research publications.

Pre-requisites

BI505 Infection and Immunity

Restrictions

Biosciences Stage 3 students only

Synopsis *

Eukaryotic pathogens; mechanisms of pathogenesis; transmission and diversity
Bacterial pathogens: virulence factors including toxins and adhesins.
Viral pathogens: mechanisms of pathogenesis and avoidance mechanisms; viruses and cancer.
Human fungal pathogens: mechanisms of transmission and epidemiology; virulence factors; host resistance mechanisms

BI610 The Cell Cycle

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	H	15 (7.5)	65% Exam, 35% Coursework	
2	Canterbury	Spring	H	15 (7.5)	70% Exam, 30% Coursework	

Contact Hours

Total Contact Hours: 20
Total Private Study Hours: 130
Total Study Hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate detailed knowledge of the Cell Cycle and its control.
Explain changes to the cytoskeleton through the cell cycle and its control.
Demonstrate a detailed understanding of apoptosis and its control.
Demonstrate a detailed knowledge of cell cycle checkpoints.
Analyse and interpret microscopy data, and present in an appropriate manner.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Retrieve, analyse and evaluate information from textbooks, primary research papers and review articles.
Demonstrate effect communication skills.

Method of Assessment

• Practical Report (2,000 words) – 30%
• Examination (2 hours) – 70%
Both the practical report and the examination are compulsory sub-elements and must be passed to complete the module

Preliminary Reading

Alberts, B. et al. (2014). Molecular Biology of the Cell (Sixth Edition). New York: Garland Science
Morgan, D.O. (2006). The Cell Cycle - Principles of Control. Oxford: OUP
Murray, A. & Hunt, T. (1994). The Cell Cycle – An Introduction. Oxford: OUP

Pre-requisites

None

Restrictions

Stage 3 Biosciences students only

Synopsis *

The module introduces the student to cell cycle and teaches how its precise regulation is essential for all life. The course will introduce to the students the current understanding of cellular reproduction and how it emerged. The initial lectures will describe the important breakthroughs in cell cycle research in their historical and experimental context. The course will go on to give the students a detailed understanding of the key events that occur and how they are regulated by mechanisms conserved from yeast to man. Key topics that will be discussed include:
Mitotic kinases (including Cdks, Polo, aurora).
Microtubule reorganisation (including spindle formation and regulation).
Actin reorganisation (including regulation of cell growth, endocytosis, and cell division)
Checkpoints (including Spindle assembly checkpoint, DNA damage checkpoint).
Meiosis.
Apoptosis.
Organelle reorganisation (e.g. nuclear and golgi reorganisation).
Cancer and the cell cycle.
Cell cycle related pathologies.
The final lectures will then introduce the students to how generating computer models of the cell cycle are playing a crucial role in defining novel avenues for research into therapies for cell cycle related diseases.

BI620 Frontiers in Virology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	H	15 (7.5)	100% Coursework	
1	Canterbury	Autumn	H	15 (7.5)	100% Coursework	

Contact Hours

Contact hours: 24
Self-Study hours: 126
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate an understanding of selected fields and the leading issues/hot topics in the field of virology and the limitations of our current knowledge about viruses and their biology.
Understand the concepts and functions behind standard cell biological, biochemical, and molecular biological assays used to study viruses.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate an ability to understand, analyse and assess published scientific data.
Assess orally-presented scientific data and concepts, providing constructive feedback.
Design and conceptualise experiments to address specific scientific questions.
Communicate effectively to a variety of audiences and/or using a variety of methods
Demonstrate problem solving skills.

Method of Assessment

Critical analysis worksheets 10%
Technical summary (750 words) 60%
Oral presentation (10 min) 30%

Preliminary Reading

Core Text: Selected articles from scientific journals will be provided from Templeman Library electronic journal collections.

Pre-requisites

None

Synopsis *

The module will develop understanding and analytical skills in virology, based around interactive seminars wherein students will analyse, present, and discuss the relevant research literature. The students will gain experience in scientific design, literature analysis, scientific communication, and the analysis of experimental data.

BI622 Advanced Immunology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	H	15 (7.5)	65% Exam, 35% Coursework	

Contact Hours

Total Contact Hours: 24
Total Private Study Hours: 126
Total Study Hours: 150

Learning Outcomes

1. Demonstrate the ability to comprehend the importance of regulation of immune function, with reference to disease states which result when regulation is defective.
2. Demonstrate an ability to critically evaluate current theories of immunological function and processes.

Method of Assessment

• Essay (2,000 words) – 35%
• Examination (2 hours) – 65%

Preliminary Reading

• Murphy, K. and Weaver, C. (2017). Janeway's Immunobiology (Nineth Edition). New York: Garland Science.
• Owen J, Punt J and Stranford, S. (2019). Kuby Immunology (Eighth Edition). New York: Macmillan Publishing.

Synopsis *

The aim of this Advanced Immunology module is to review topical aspects of advanced immunology with emphasis on the regulation of the immune response, and the role of dysfunctional immune systems in the aetiology of a variety of disease states. Indicative topics include antigen processing and presentation, transplant rejection, autoimmunity, hypersensitivity, cell migration homing and extravasation, cytokines, tumour immunology, mucosal immunology and autophagy.

BI626 Integrated Endocrinology and Metabolism

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	H	15 (7.5)	65% Exam, 35% Coursework	
1	Canterbury	Autumn	H	15 (7.5)	65% Exam, 35% Coursework	

Contact Hours

Total contact hours: 27
Private study hours: 123
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
An understanding of the underlying principles of endocrinology at the cellular, biochemical and physiological level.
The ability to describe, using illustrative examples, the different control mechanisms at work within the endocrine system both in the maintenance of whole body homeostasis and in disease.
An understanding of the methods available for the diagnosis of specific endocrine diseases including the measurement of electrolyte and hormone levels, and the role of dynamic testing.
The ability to integrate clinical and biochemical data to evaluate the most probable cause of key endocrine disorders, including a rationale for the most appropriate treatment regimes.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Interpretation and retrieval of information (knowledge management).
Analysis and evaluation of data (problem solving).
Communication of understanding and analysis through a variety of approaches (group work, tests and written report).

Method of Assessment

Test (10.5%) (1h)
Case Study (24.5%) (2500 words maximum)
Exam (65%) (2 hr)

Preliminary Reading

Clinical Biochemistry Gaw, A., Cowan, R.A., O'Reilly, D.St. J.,et al (2013)
Clinical Biochemistry (2nd Edition) Churchill Livingstone. Ahmed, N (Ed) Clinical Biochemistry (2016) OUP
Endocrinology. Essential Endocrinology and Diabetes (2012), Holt, R.I.G & Hanley, NA (6th Edition), Blackwell Science

General Physiology Core Physiology texts recommended for first and second year modules, for example, Silverthorn.
Integrated metabolism Core Biochemistry texts recommended for second year modules, for example, Lehninger.

Pre-requisites

BIOS5130 Physiology

Restrictions

Stage 3 Biosciences students only

Synopsis *

This module focuses on the endocrine system, which in conjunction with the nervous system, is responsible for monitoring changes in an animal's internal and external environments, and directing the body to make any necessary adjustments to its activities so that it adapts itself to these environmental changes.

The emphasis will be on understanding the underlying principles of endocrinology, the mechanisms involved in regulating hormone levels within tight parameters in an integrated manner and the central importance of the hypothalamic-pituitary axis.

During the lectures each major endocrine gland or functional group of glands will be explored in turn and specific clinical disorders will be used to illustrate the role of the endocrine organs in the maintenance of whole body homeostasis. The systems studied will include the following: thyroid gland, parathyroid gland and bone metabolism, adrenal gland, renal hormones (water and salt balance), pancreatic hormones, gut hormones and multiple endocrine neoplasia, gonadal function and infertility.

Consideration will be given to the methods available for the diagnosis of specific endocrine diseases, including the measurement of electrolyte and hormone levels, and the role of dynamic testing.

The role of the endocrine system in integrating metabolic pathways will be emphasised throughout the module and particular scenarios such as infertility, diabetes mellitus.

BI627 Haematology and Blood Transfusion

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	H	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Autumn	H	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Total Contact Hours: 29
Total Private Study Hours: 123
Total Study Hours: 150

Learning Outcomes

1. Show a detailed understanding of the factors affecting the production and development of red and white blood cells.
2. Demonstrate complex knowledge of the processes involved in disease of both red and white blood cells.
3. Recognise the features of a variety of pathological conditions encountered in haematology.
4. Demonstrate a critical understanding of the factors involved in the maintenance of haemostasis and how they interact.
5. Demonstrate a detailed understanding of the principles of blood component replacement therapy and the associated risks.
6. Recognise the characteristic changes of blood parameters in selected disease states.
7. Experimental approaches used to investigate haematological disease.

Method of Assessment

• Practical Report (2,000 words) – 40%
• Examination (2 hours) – 60%

Preliminary Reading

• Anstee, D. and Klein, H.G. (2014). Mollison's Blood Transfusion in Clinical Medicine (Twelfth Edition). Chichester: Wiley-Blackwell
• Moore, G., Knight, G., and Blann, A. (2016). Haematology (Second Edition). Oxford: Oxford University Press
• Roberts, D.J., Yazer, M.H., and Murphy, M.F. (2017). Practical Transfusion Medicine (Fifth Edition). Chichester: Wiley-Blackwell

Synopsis *

This module describes the anatomy, physiology, pathology of the blood and blood forming tissues. It covers a wide range of disorders including haematological malignancies. Blood transfusion theory and practice are introduced. Roles for haematopoietic stem cells during blood cell development and as therapeutic agents are discussed. Students will be exposed to ethical and regulatory concerns with regard to transfusion and blood cell therapies.

BI628 Microbial Physiology and Genetics II

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	H	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Total Contact Hours: 30
Total Private Study Hours: 120
Total Study Hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate comprehensive knowledge and understanding of the structural and metabolic diversity of microorganisms.
Demonstrate critical understanding of genetic and physiological regulation in microorganisms.
Demonstrate thorough knowledge and understanding of the experimental approaches used to investigate physiological and genetic control in microorganisms.
Demonstrate the ability to work individually to solve biological problems.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate effective communication skills in a variety of ways.
Analyse and evaluate complex experimental data confidently.

Method of Assessment

Practical Assessment (10 questions) – 40%
Examination (2 hours) – 60%

Preliminary Reading

Milo, R. and Phillips, R. (2015). Cell Biology by the Numbers (First Edition). New York: Garland Science (Taylor & Francis Group).
Slonczewski J. and Foster J. (2020). Microbiology an Evolving Science. (Fifth Edition). New York and London: W.W. Norton & Co.

Pre-requisites

BIOS5480 Microbial Physiology and Genetics I

Restrictions

Stage 3 Biosciences students only

Synopsis *

This module will cover the following:
• Outline of microbial physiology and genetics
• Microbial metabolism and homeostasis
• Control of microbial physiology through gene expression regulation – Transcriptional and post-transcriptional regulation of gene expression
• Experimental approaches used to study microbial genomes and gene expression
• Microbial biodiversity and complex signalling in the environment

BI629 Proteins: Structure and Function

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	H	30 (15)	60% Exam, 40% Coursework	

Contact Hours

Total contact hours: 70
Private study hours: 230
Total study hours: 300

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:

Demonstrate an understanding of the structural organisation and biophysical properties of proteins together with their physiological function in terms of catalysis, ligand binding and as components of molecular machines.
Demonstrate an understanding of how the structure and function of proteins are studied and characterised using current biophysical methods such as mass spectroscopy, x-ray diffraction, nuclear magnetic resonance, fluorescence, circular dichroism, electron microscopy, atomic force microscopy and rapid mixing apparatus.
Use web-based tools to retrieve and manipulate protein-related data from international repositories, and the use of molecular graphics software to analyse protein structure in relation to topology and function.
Demonstrate knowledge and understanding of the instrumentation and the type of data generated by the techniques listed above using modern research equipment in the Research Facilities and Research Labs of the School of Biosciences.

The intended generic learning outcomes. On successfully completing the module students will be able to:

Communicate effectively using writing.
Handle and analyse experimental data (including numerical data).
Problem solve.
Use web tools, data repositories, and computer software.

Method of Assessment

Course work assignments (x3). Handling, analysis and interpretation of experimental data. (13.3% each)
Exam 1 (2h) Essay (30%)
Exam 2 (2h) Problem solving (30%)

Preliminary Reading

Williamson, M. (2011) How Proteins Work. Garland Science
Lesk, A.M. (2016, 3nd ed.) Introduction to Protein Science. Architecture, function and genomics. Oxford University Press
Price & Nairn (2009) Exploring Proteins. Oxford University Press
Rhodes G (2006, 3rd ed.) Crystallography Made Crystal Clear. Academic Press
Steven, Baumeister, Johnson & Perham (2016) Molecular Biology of Assemblies and Machines.

Pre-requisites

BIOS3000 Introduction to Biochemistry
BIOS5320 Skills for Bioscientists 2

Restrictions

Stage 3 Biosciences students only

Synopsis *

The module will cover the structural analysis of proteins and protein assemblies using techniques such as fluorescence, circular dichroism, mass spectrometry, atomic-force microscopy, cryo-EM, X-ray crystallography and NMR. It will also look at protein folding, molecular processing, de novo design, engineering and modelling. The module will also investigate the relationship between protein structure and function and cover the principles and practice of enzymology, ligand binding, and enzyme catalysis.

BI638 Bioinformatics and Genomics

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	H	15 (7.5)	100% Coursework	

Contact Hours

Total contact hours: 32
Private study hours: 118
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Use DNA/protein databases, sequence searching methods, generate multiple sequence alignments, analyse residue conservation.
Use bioinformatics methods to analyse and model protein structure, function and interactions with small ligands and with other proteins.
Understand genomics approaches including – genome sequencing, comparative and functional genomics.

The intended generic learning outcomes. On successfully completing the module students will be able to use:
Bioinformatics skills for data retrieval and analysis across the biosciences' disciplines. Data retrieval/analysis are generic to all numerate subjects.
Transferable skills including written communication (technical reports and a coursework project).
Analytical skills including analysis and presentation of data, writing of reports and a project (coursework).

Method of Assessment

Workshop (20% - short answer questions)
Assignment (80% - 2000 words)

Preliminary Reading

a. Lesk A, Introduction to Bioinformatics, 5th Edition, Oxford University Press, 2019
b. Lesk A, Introduction to Genomics, 3rd Edition, OUP, 2017

Additionally selected peer-reviewed research and review papers will be recommended.

Pre-requisites

BIOS3000 Introduction to Biochemistry
BIOS5320 Skills for Bioscientists 2

Restrictions

Stage 3 Biosciences students only

Synopsis *

Bioinformatics Data sources & Sequence analysis: Databases and data availability. Using sequence data for analysis – sequence searching methods, multiple sequence alignments, residue conservation, Protein domains and families.

Protein Bioinformatics Methods: Protein structure and function prediction. Prediction of binding sites/interfaces with small ligands and with other proteins. Bioinformatics analyses using protein data.

Genomics: An introduction to the analysis of genomic data, primarily focussing on the data available from genome sequencing – how it can be used to study genetic variants and compare genomes (i.e. comparative and functional genomics).

BI639 Frontiers in Oncology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	H	15 (7.5)	100% Coursework	

Availability

It is strongly recommended that you have taken core stage 1 and 3 modules within one of our Biosciences programmes

Contact Hours

Contact hours: 23
Self-Study hours: 127
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will have:
An understanding of selected fields and the leading issues/hot topics in the field of oncology and the limitations of our current knowledge about oncology.
An understanding of the concepts and functions behind standard cell biological, biochemical, and molecular biological assays used in oncological research.

The intended generic learning outcomes. On successfully completing the module students will have developed:
The ability to understand, analyse and assess published scientific data.
The ability to assess presented scientific data and concepts, providing constructive feedback.
The ability to design and conceptualise experiments to address specific scientific questions.
The ability to communicate effectively to a variety of audiences and/or using a variety of methods.
Problem solving skills.

Method of Assessment

Critical analysis worksheets (7x 350words) 10%
Technical summary (750 words) 60%
Oral presentation (10 min) 30%

Preliminary Reading

Core Text: Selected articles from scientific journals will be provided from Templeman Library electronic journal collections.

Pre-requisites

None

Restrictions

Stage 3 Biosciences students only

Synopsis *

The module aims to develop understanding and analytical skills in oncology, based around interactive seminars wherein students will analyse, present, and discuss the relevant research literature. The students will gain experience in scientific design, literature analysis, scientific communication, and the analysis of experimental data.

BI642 Cancer Biology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	H	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Autumn	H	15 (7.5)	60% Exam, 40% Coursework	
1	Canterbury	Spring	H	15 (7.5)	100% Exam	

Contact Hours

Total contact hours: 24
Private study hours: 126
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Understand the nature of cancer and the (molecular) processes underlying cancer formation and progression.
Demonstrate knowledge of the principles underlying anti-cancer therapies.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate written communication skills at a standard appropriate for level 6 study
Acquire information from a wide range of information resources, including journals, books, electronic databases); maintenance of an effective information retrieval strategy
Understand, analyse and critically assess published scientific data

Method of Assessment

Examination (60%), 2 hours
Continuous assessment (40%)
Critical analysis (word limit 750)

Preliminary Reading

Core text
Pecorino, L. Molecular Biology of Cancer: Mechanisms, Targets and Therapeutics (3rd edition) Oxford University Press. 2012.

Supplementary materials

Selected articles from scientific journals will be provided from the Templeman Library electronic journal collections.

Weinberg, R.A. The Biology of Cancer. New York; Abingdon: Garland Science, 2007
Alberts, B., Essential Cell Biology. New York; London: Garland Science 2011.

Pre-requisites

None

Restrictions

Stage 3 students only

Synopsis *

Cancer formation and progression; underlying factors, cancer cell heterogeneity, uncontrolled cell division, invasive growth/metastasis formation.

The Molecular Biology of Cancer: (Proto-)oncogenes, tumour suppressor genes, cell cycle control, cell death.

Cancer therapies

BI643 Neuroscience

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	H	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Total contact hours: 26
Private study hours: 124
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate a systematic understanding of the cellular and molecular functions of the nervous system gained through knowledge of how nerve cells communicate at synapses.
Demonstrate a systematic understanding of sensory and cognitive processes.
Demonstrate a systematic understanding of acquired and inherited neurological diseases.
Demonstrate an appreciation of the significant achievements of research in neuroscience and the many unanswered questions (limits of our knowledge).

The intended generic learning outcomes. On successfully completing the module students will be able to:
Comprehend complex scientific topics.
Source, read and evaluate scientific literature.
Analyse and evaluate data
Communicate effectively in writing.

Method of Assessment

Data analysis exercise (20%), max 1500 words
Test with multiple choice questions, 45 min (20%)
Exam, 2 h (60%)

Preliminary Reading

Principles of Neural Science, Kandel, Schwartz, Jessel, Siegelbaum, Hudspeth, 5th ed (2012)
Fundamental Neuroscience, Squire, Berg, Bloom, du Lac, Ghosh, Spitzer, 4th ed (2012)
Neuroscience, Purves, Augustine, Fitzpatrick, Hall, La Mantia, White, 5th ed (2011)
Research articles available from Templeman Library journal collections.

Pre-requisites

BIOS5130 Human Physiology and Disease II

Restrictions

Stage 3 Biosciences students only

Synopsis *

The module deals with basic neuroanatomy and molecular and cellular neurobiology, such as transmission of signals within the nervous system and sensory perception. It explores more complex functions of the nervous system, e.g. behavioural and cognitive functions including learning, memory, emotions and appetite control. Throughout the module both the normal nervous system and disorders that arise as a consequence of abnormalities will be covered.

BI644 Biology of Ageing

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Spring	H	15 (7.5)	60% Exam, 40% Coursework	

Availability

It is required that you have taken all the core modules within stage 1 and 2 of one of our Bioscience programmes in order to take this module.

Contact Hours

Total Contact Hours: 26
Independent Study Hours: 124
Total Study Hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate knowledge of the major processes underlying the ageing process.
Demonstrate practical and data handling skills associated with analysing lifespan and age-related decline data sets.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Interpret and retrieve information
Analyse and evaluate data
Demonstrate written communication skills

Method of Assessment

Assignment 1: Data analysis and interpretation, 40%, Maximum 1500 words.

Examination, 2 hr, 60%

Preliminary Reading

Suggested reading will consist of review articles and primary research publications. The emphasis of this course will be to read and interpret the scientific literature first hand.
Some extracts or reading will also be recommended from "Biology of Aging" first edition CRC press by Roger B McDonald.

Pre-requisites

Compulsory Stage 1 and 2 Biosciences modules as well as BI501 Gene expression and control and/or BI549 The Genome (optional modules).

Restrictions

Stage 3 Biosciences students only

Synopsis *

The module provides a detailed molecular basis for the ageing process. It reviews the organisms and experimental methods used to study ageing, and discusses the findings of this work to provide both knowledge and context to the process of ageing.

Topics may include: Importance and principles of ageing research
Why do organisms age and theories of ageing
Overview of processes and pathways controlling ageing

How ageing and lifespan is measured.

Signalling pathways that control ageing

Diseases of ageing

Ethics of ageing research
There will be two workshops: Workshop 1: Data analysis session (whole class or 2-3 groups).
Workshop 2: Group discussion of key ageing research paper(s) (small groups).

BI650 Advances in Eukaryotic Diversity and Evolution

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	H	15 (7.5)	100% Coursework	
2	Canterbury	Autumn	H	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Total Contact Hours: 24
Total Private Study Hours: 126
Total Study Hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate detailed knowledge of the major processes underlying eukaryotic diversity and evolution.
Demonstrate confident practical skills and data handling methods associated with taxonomy, diversity and evolution of eukaryotes.
Demonstrate complex understanding of the genetic basis of biodiversity.
Confidently integrate knowledge of eukaryotic diversity and evolution with the genetic basis of biodiversity.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Interpret and retrieve information critically.
Analyse and evaluate complex data confidently.
Demonstrate effective communication skills in a variety of ways.

Method of Assessment

• Practical Report (1,500 words) – 40%
• Examination (2 hours) – 60%
The practical report is a compulsory sub-element and must be passed to complete the module

Preliminary Reading

Archibald, J. (2014). One Plus One Equals One: Symbiosis and the Evolution of Complex Life. Oxford: Oxford University Press.
Foissner, W. and Hawksworth, D.L. (2009), Protist Diversity and Geographical Distribution. Dordrecht: Springer.
Herron, J. C. and Freeman, S. (2014). Evolutionary Analysis. Harlow: Pearson.
Katz, L.A. and Bhattacharya, D. (2006). Genomics and Evolution of Microbial Eukaryotes. Oxford: Oxford University Press.
Lane, N. (2005). Power, Sex, Suicide: Mitochondria and the Meaning of Life. Oxford: Oxford University Press.
Lane, N. (2009). Life Ascending: The Ten Great Inventions of Evolution. London: Profile Books.

Pre-requisites

None

Progression

The programmes of study to which the module contributes
The module will be core for stage 3 students undertaking the BSc Biology and related programmes

Restrictions

The module will be core for stage 3 students undertaking the BSc Biology and related programmes.

Synopsis *

This module will introduce the students to the taxonomy and diversity of eukaryotic organisms in the various domains of the tree of life. Students will become familiarised with the various theories on the evolution and adaptations of both unicellular and multicellular eukaryotes. It will also teach the techniques and skills required to analyse the diversity and evolution of these organisms at the genomic level.

BI797 Sandwich Year Assessment

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	H	120 (60)	100% Coursework	

Contact Hours

Students will spend between 9-12 months working at the organisation hosting their placement.

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate an awareness of the application of, and ability to apply, degree level scientific knowledge to the workplace.
Record, analyse and interpret data, and use graphical and statistical methods for presentation, in accordance with scientific convention.
Perform an independent research project, under supervision, which enhances existing practical and/or theoretical scientific knowledge and skills.
Structure, develop and defend complex scientific arguments by understanding and applying expanding knowledge base and critically appraising own and published work.
Develop ability to present and communicate scientific work in various formats.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Apply their developing scientific knowledge productively for understanding their work.
Make informed and effective use of available resources (e.g. information technology, library) in acquiring, analysing, managing and presenting data, information and knowledge necessary for the planning and execution of work/study activities.
Understand the notion of professional ethics and responsibilities.
Understand the role of the individual within an organisation.
Appreciate and evaluate both individual and teamwork contributions to work place activities and projects through work experience.
Work effectively independently and within a team developing planning, organisational time management, communication, negotiation and interpersonal skills.
Exploit feedback from peers, supervisors and colleagues to enhance any or all aspects of performance.
Demonstrate an awareness of career opportunities for bioscience graduates, and an appreciation of the wider application of degree studies, and hence be in a position to make better informed judgements about career plans and the role of further post-graduate training.

Method of Assessment

Supervisor performance (30%)
Written report – max 6000 words (50%)
Oral presentation – 10-15 minutes (20%)

Preliminary Reading

Research papers, reports, technical etc. Literature relevant to the work placement and associated project(s).

Pre-requisites

Registration for any Biosciences BSc degree
Approval by the School (based on grades achieved at Stage 1 and general performance)

Restrictions

To continue on, or transfer onto, a degree programme with a sandwich year students must achieve an overall average mark of 60% in stage 1 modules.

Synopsis *

A placement typically is a 9-12 month internship with a commercial or public sector or charity organisation which provides opportunities for the student to develop graduate level subject-specific and generic employability skills. Choice of placement by student will be guided and facilitated at UoK with the learning outcomes listed above in mind. It is requested by UoK that the student be closely guided in work (usually with a named supervisor) involving specialist training. Placements are expected to have a scientific research focus and incorporate a project element that may be written up as a scientific report, however, the specific type of work undertaken may vary significantly from placement to placement. The research project should occupy not less than thirty percent of the sandwich year.

BI798 Professional Year

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Whole Year	H	120 (60)	Pass/Fail Only	

Contact Hours

Students will spend between 9-12 months working at the organisation hosting their placement.

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate an awareness of the application of, and ability to apply, knowledge and skills gained during a biosciences degree in the workplace.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Perform independent work under supervision, which enhances generic graduate level employability skills
Develop ability to record, analyse, interpret and communicate information in various formats in accordance with the norms of the business.
Make informed and effective use of available resources (e.g. information technology, library) in acquiring, analysing, managing and presenting data, information and knowledge necessary for the planning and execution of work/study activities.
Understand the notion of professional ethics and responsibilities.
Understand the role of the individual within an organisation.
Appreciate and evaluate both individual and teamwork contributions to work place activities and projects through work experience.
Work effectively independently and within a team, developing planning, organisational, time management, communication, negotiation and interpersonal skills.
Exploit feedback from peers, supervisors and colleagues to enhance any or all aspects of performance.
Demonstrate an awareness of career opportunities for bioscience graduates, and an appreciation of the wider application of degree studies, and hence be in a position to make better informed judgments about career plans and the role of further post-graduate training.

Method of Assessment

Module is assessed on a Pass/Fail basis made up of the following elements of assessment:

Supervisor performance (30%)
Written report – max 600 words (50%)
Oral presentation – 10-15 minutes (20%)

Preliminary Reading

Papers, reports, technical etc. literature relevant to the work placement and associated project(s).

Pre-requisites

Registration for any Biosciences BSc degree programme
Approval by the School (based on grades achieved at Stage 1 and general performance)

Progression

The programmes of study to which the module contributes to:

Biochemistry with a Professional Year
Biomedical Science with a Professional Year
Biology with a Professional Year

Synopsis *

A placement will normally be a 9-12 month internship with a commercial, public sector or charity organisation which provides opportunities for the student to develop graduate level employability skills. Choice of placement by the student will be guided and facilitated at UoK with the learning outcomes listed above in mind. It is requested by UoK that the student be closely guided in work (usually with a named supervisor). The specific type of work undertaken may vary significantly from placement to placement. The work may have a scientific or non-scientific focus. Indicative examples are marketing and sales, manufacturing, business and management.