25 School of Biosciences

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

BI827		Advanced Drug Design				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	30 (15)	100% Coursework	

Contact Hours

The module comprises of a number of practical workshops and seminars to introduce the key concepts and practical techniques for each of the disciplines covered in the drug design module. The workshops will be aligned with a two week practical to design, express, purify, characterise a target protein in a suitable format for biophysical screening and characterisation in a drug screening process. The workshops and seminars will be complemented by a series of lectures to introduce the fundamental knowledge that underpins the techniques covered. There will be a number of guest lectures from industrialists skilled in the areas and with a broad knowledge of the multidisciplinary nature of drug design. Additionally there are planned visits to an industrial site. Students will also be expected to present a review of a relevant recent paper at a Journal club and write a short review of their findings. Additionally there will be a theoretical group task to design discover a novel approach and design a discovery program to a disease.

Seminars and workshops (including preparation time) (40 h)
Laboratory practical and write up (40 h)
Lectures (including guest lectures) (40 h)
Industrial Site visits (15 h)
Journal Club (preparation and write up) (15 h)
Self Study (150 h)

Learning Outcomes

The intended subject specific learning outcomes and, as appropriate, their relationship to programme learning outcomes:
a. Knowledge and understanding of drug discovery and design including the techniques used in identifying and elaborating new molecular entities for therapeutic intervention.
b. Practical experience of discovery programme design and a selection of approaches utilised
c. Experimental design and analysis

The intended generic learning outcomes:
a. Communication; the ability to organise information clearly and present both orally and in a written format for a variety of audiences including both academic and industrial scientists.
b. Analytical Skills – processing, interpretation and critical analysis of information from literature and databases and experimental data sources. An ability to choose appropriate data and experimental design to test and validate hypotheses.
c. Self-motivation and independence. Time and Workload management to meet targets (including experimental) and deadlines.
d. Information technology. Understanding and utilisation of technology to search, retrieve and process data and scientific information.

Method of Assessment

In-class test (one problem and one essay) (40 %)
Practical and write up (40%)
Journal Club presentation and write up (20%)

Preliminary Reading

The reading list will focus mainly on the latest scientific literature including primary research articles. This will be used to exemplify taught course components through case study based approaches. Students will be provided with the majority of this reading material although in some cases retrieving additional material from journals will form the basis assignments. Key Journals for the course will be Journal of Medicinal Chemistry and Bioinorganic Medicinal Chemistry Letters, together with Nature Drug Discovery and Drug Discovery Today for review articles. Many standard biochemistry and Chemistry textbooks available within the library will also cover many elements of the course material.

Pre-requisites

Synopsis *

The module will consider the key aspects of drug design providing an overview of the drug discovery process and more in depth analysis and experience of early stage drug discovery focusing on therapeutic target identification and analysis, with consideration of mode of intervention. The course will cover the development screening approaches with an emphasis on small molecule hit identification and validation with practical experience of the approaches used in lead optimisation. It will also provide an insight into molecular pharmacology, safety and concepts of formulation considerations. The module will be delivered through seminars, workshops by specialists in the techniques utilised by the pharmaceutical and biotech industry, including external specialists. It will include case studies and a practical involving screening design and in-silico follow up of hit matter.

BI830 Science at Work

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	30 (15)	100% Coursework	

Contact Hours

Total contact hours: 30
Private study hours: 270
Total study hours: 300

Learning Outcomes

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

Understand the principles and importance of public engagement with science.
Demonstrate critical and practical knowledge on how to communicate science to different public, private and professional stakeholders.
Recognise the range of scientific career structures available outside the laboratory.
Demonstrate knowledge and understanding of the social and political impact of science

The intended generic learning outcomes. On successfully completing the module students will be able to:
Marshal and critically evaluate information effectively through the use of primary and secondary sources.
Demonstrate independence of thought.
Work effectively as part of a team.
Communicate science to non-scientific public and professional audiences.

Method of Assessment

New Scientist article (1,000 words) (25%)
Essay (2,000 words) (25%)
Scientific blog, covering topical science for a public audience (4,000 words) (50%)

Preliminary Reading

J. Gregory, S. Miller, Science in Public: Communication, Culture and Credibility (Perseus, US, 2000)

Pre-requisites

None

Synopsis *

Science has a profound influence on public life. This module considers the ways in which different professional and public groups interact with science and scientists, and how this influences the work that scientists do. It considers the social roles and responsibilities of scientists beyond their own scientific research, the context in which science operates, and the careers that exist for scientists outside of the traditional laboratory environment. In considering specific scientific developments in light of ethics, policy, media and public perception, the module will develop a range of academic skills that support learning in more specialised modules. It also provides transferable skills valued in the science sector, particularly science communication.

BI835 Science Communication and Society Project

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	60 (30)	100% Project	

Contact Hours

Students will meet with their supervisors to discuss their work in progress.

They can expect a total of up to 4 hours' one-to-one contact with their supervisor in the course of preparing their work during the summer term. Meetings with a supervisor are guaranteed within term-time; over the summer vacation meetings are at the supervisor's discretion. By this time students are expected to have prepared themselves adequately to complete their dissertation without further assistance.

Students are expected to put in a total of 600 hours' work in the preparation of their project.
The dissertation should be 12,000 words long.

Learning Outcomes

The intended subject specific learning outcomes:
a. They will have improved their appreciation of the social and cultural mechanisms that shape the production of scientific knowledge
b. They will understand the role of communicational media in propagating and shaping scientific knowledge
c. An appreciation of how research leads to knowledge
d. Students will gain in-depth knowledge of a chosen episode in the history of science from the scientific revolution to the present
e. They will understand key methods in the history of science
f. Students will have an in-depth understanding of an advanced research topic
g. Develop ability to simplify complex scientific information for a non-scientific audience

The intended generic learning outcomes:
h. Through the use of primary texts as well as secondary sources, students will be able to marshal information effectively
i. They will develop a critical, analytic perspective on such information
j. Through encountering new critical perspectives on science, students will develop independence of thought
k. The dissertation will improve students' communication
l. Students will enhance their proficiency with regard to improving their own learning and performance

Method of Assessment

For dissertation projects:
The module will be 100% assessed on the basis of the written dissertation. Students are expected to include research on both primary and secondary sources. They are expected to engage with scholarship and critical debates connected with their chosen field of study.

For practical projects:
20% of the mark will be awarded for a research dissertation on the topic, to be agreed after discussion with the student and academic supervisor (10,000 words).
10% of the mark will be for a written document outlining the aims of the project, needs of the audience, and how these needs will be matched by the proposed activities (5,000 words).
50% of the mark will be for the science communication package developed. The mark will include the research undertaken on the audience, appropriateness of the material for the audience, depth of science and presentation.
20% of the mark will be awarded for evaluation strategy and the interpretation of evaluation data (5,000 words plus appendices).

Preliminary Reading

Each student's reading list will be unique, based upon their chosen area of research. They will discuss possible readings with their chosen supervisor. The supervisor will make some suggestions but it is part of the research brief that students should generate their own bibliographies.

Pre-requisites

Whilst taking this module you must take HI866 - Science and Medicine in Context, and BI830 Science@work

Synopsis *

For dissertation projects:
Following discussion with their supervisors, students will generate their own title for a dissertation. Preparation of the dissertation is described below.

For practical projects:
This extended project will be particularly suited to students who have entered the programme with a first degree in the sciences. The project will involve the development of an extensive "package", using appropriate media to communicate scientific principles, which can subsequently be used by appropriate non-specialist audiences. As part of the project, students must research their chosen audience to ascertain their needs in terms of communicating science. The project must be informed by a period of in-depth research on the scientific topic and preparation of a dissertation. Having developed a suitable package of activities, students will then develop evaluation methods to monitor their project work, and apply these methods to evaluate effectiveness. Interpretation of evaluation data will be undertaken during the final stages of the project.

BI836 Practical and Applied Research Skills for Advanced Biologists

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	30 (15)	100% Coursework	
2	Canterbury	Autumn	M	30 (15)	100% Coursework with Pass/Fail Elements	

Contact Hours

Total contact hours: 62
Private study hours: 238
Total study hours: 300

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have
Knowledge and understanding of key principles in molecular biology.
Practical experience of modern molecular biology and its application to solve research problems.
Experimental design within a biological research context.
Interpretation of biological data.
Organisation and presentation of experimental data.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Communication: ability to organise information clearly, present information in oral and written form, adapt presentation for different audiences.
Analytical skills: interpretation of data, marshalling of information from published sources, critical evaluation of own research and that of others.
Team work: the ability to work both independently and as part of a research group using peer support, diplomacy and collective responsibility.
Self-motivation and independence: time and workload management in order to meet personal targets and imposed deadlines.
Information technology: use of appropriate technology to retrieve, analyse and present scientific information.

Method of Assessment

Assessments associated with online workshops (Pass/Fail at 70% pass mark; multiple attempts permitted until pass mark is achieved)
Peer Review Assignment (40% of module mark)
Lab report (4,000 words) (60% of module mark)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for retrieving appropriate journal articles to which we already have access.

Pre-requisites

None

Synopsis *

The module aims to develop understanding and practical skills in molecular biology, based around interactive workshops, practical sessions and group work. The module will involve practical sessions covering key practical and transferable skills in molecular biology and biotechnology, in the context of an extended mini-project focused on CRISPR-Cas9-based genome editing - a cutting-edge technology with wide application in the biological sciences. These will be accompanied by interactive workshops and classes that review the theory of these techniques, and will use case studies to illustrate their impact and importance in both academic and industrial settings and in different biological contexts. Students will learn skills in experimental design using appropriate case studies that will embed them within the relevant research literature. They will also gain experience of analysis and statistical interpretation of complex experimental data.

BI837		The Molecular and Cellular Basis of Cancer				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total Contact Hours: 27
Total 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:
Demonstrate comprehensive understanding of the hallmarks of cancer.
Demonstrate extensive knowledge and understanding of the molecular changes that lead to the development of specific cancers.
Demonstrate wide-ranging understanding of the changes in cellular and tissue pathology in specific cancers.
Demonstrate a broad understanding of the global incidence of different type of cancer, their clinical manifestations and the risk factors in their development and treatment.
Demonstrate complete knowledge and understanding of the practical methods for distinguishing malignant and healthy tissue.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate the ability to organise information clearly, present information in a variety of forms, and adapt presentation for different audiences.
Interpret data accurately, marshalling information from published sources, and critically evaluate their own research and that of others.
Make use of constructive informal feedback from staff and peers and assess own progress to enhance performance and personal skills.
Demonstrate an ability to manage their time and workload efficiently to meet personal targets and imposed deadlines.
Demonstrate a professional ability to use appropriate technology to retrieve, analyse and present information.

Method of Assessment

Essay (2,000 words) – 50%
Examination (2 hours) – 50%

Preliminary Reading

Weinberg, R.A. (2014). The Biology of Cancer, Second Edition. New York: Garland Press

Pre-requisites

None

Synopsis *

This module will introduce the key mechanisms, processes and factors that underpin cancer development, including oncogenes, tumour suppressor genes, growth factor signalling and angiogenesis. It will review the different types of cancer and their global incidence, comparing this with environmental and cultural risk factors. Inherited predisposition will be covered within the context of specific cancers, and the clinical and pathological manifestation of specific tumours will be explored in lectures.

BI838 Genomic Stability and Cancer

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

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 a knowledge and understanding of:
Endogenous and exogenous sources of DNA damage and their relationship with cancer incidence.
Key mechanisms involved in maintaining genomic integrity.
The relevance of the biological response to DNA damage to disease incidence and therapy.
Biological investigation of DNA damage and its repair.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Organise information clearly, present information in oral and written form, adapt presentation for different audiences.
Interpret data, marshal of information from published sources, critically evaluate own research and that of others.
Make use of constructive informal feedback from staff and peers and assess own progress to enhance performance and personal skills.
Manage time and workload in order to meet personal targets and imposed deadlines.
Make use of appropriate technology to retrieve, analyse and present scientific information.

Method of Assessment

Critical analysis essay (2,500 words, 50%)
Exam (2 hours, 50%)

Preliminary Reading

DNA Repair and Mutagenesis, Friedberg et al, ASM Press (Second Edition)
The Biology of Cancer, Weinberg, Garland Science (Second Edition)

Pre-requisites

None

Synopsis *

This module introduces and develops knowledge in the key area of genomic maintenance. Students will learn how loss of genomic integrity leads to enhanced cancer incidence, and how biological processes and the environment contribute to genetic instability. Cellular mechanisms that lead to cancer incidence, together with those that protect cells from the onset of carcinogenic processes will be reviewed. This module will also examine the use of DNA damaging agents in cancer therapies, reviewing the most recent literature in this field.

BI840 Cancer Therapeutics: From the Laboratory to the Clinic

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
3	Canterbury	Spring	M	15 (7.5)	100% Coursework	

Contact Hours

Total Contact Hours: 27
Total 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:
Demonstrate comprehensive understanding and critically evaluate current clinical management of cancer.
Demonstrate a critical appreciation of stages of pharmaceutical development in harnessing laboratory-based research through pre-clinical and in vivo evaluation and clinical trials.
Demonstrate a broad understanding of the industrial and regulatory processes that lead to the licensing of therapeutic drugs.
Demonstrate knowledge and understanding of the development of specific therapeutic agents and the complex processes that determine progression from the bench to the clinic, for instance small chemical entities and antibody conjugates.
Demonstrate cutting-edge understanding and knowledge of the complexity of personalisation of medicine in the "omics" era.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate the ability to organise information clearly, present information in a variety of forms, and adapt presentation for different audiences.
Interpret data accurately, marshalling information from published sources, and critically evaluate their own research and that of others.
Make use of constructive informal feedback from staff and peers and assess own progress to enhance performance and personal skills.
Demonstrate an ability to manage their time and workload efficiently to meet personal targets and imposed deadlines.
Demonstrate a professional ability to use appropriate technology to retrieve, analyse and present information.

Method of Assessment

Essay (1,000 words) – 50%
Report (2,000 words) – 50%

Preliminary Reading

Ritter, J.M. et al. (2019). Rang and Dale's Pharmacology, Nineth Edition. London: Elsevier

Pre-requisites

None

Synopsis *

This module provides students with critical perspectives upon current and emerging cancer therapies, how they are developed, and how they are applied in the clinical setting. The harnessing of scientific knowledge in the treatment of disease requires a complex series of highly regulated studies that must be performed under highly regulated legal and ethical frameworks. This module reviews the transition from promising cancer therapy to fully realised therapeutic agent, using specific therapies as examples. It will also discuss the emerging potential for personalised medicine based on patient-specific molecular biomarkers.

BI841 The Science of Reproductive Medicine

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

Contact Hours

Total contact hours: 82
Private study hours: 218
Total study hours: 300

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
A broad knowledge and understanding of the scientific basis of reproductive medicine as outlined in the course content.
The ability to synthesise and present their knowledge and understanding as a reasoned, coherent piece of work.
The ability to search, synthesise and evaluate the scientific literature pertaining to reproductive medicine.
The ability to analyse and apply unfamiliar data sets and apply the knowledge gained in unfamiliar situations.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have:
An ability to search primary texts as well as secondary sources and marshal information effectively.
A critical, analytical perspective on the scientific literature.
Some independence of thought and originality in the presentation of a scientific document.
The ability to reference the scientific literature properly and present a bibliography in a means consistent with a scientific document.
The ability to present a range of scientific media (graphs, tables, figures, video, large datasets etc.) in an appropriate fashion.
The ability to give a competent scientific presentation.

Method of Assessment

Ongoing assessment (~12) set by individual lecturers at the end of their teaching period, times and formats vary (50%)
Presentation (10 minutes) (20%)
Dissertation (3,000 words) (30%)

Preliminary Reading

Speroff L, Glass RH, Kase NG. Clinical Gynecologic Endocrinology and Infertility. Williams and Wilkins, Baltimore MD
Shah K, Sivapalan G, Gibbons N, Tempest H, Griffin DK (2003) The genetic basis of infertility. Reproduction 126: 13-25
Semen analysis: a new manual and its application to the understanding of semen and its pathology. Asian Journal of Andrology 12, 11-13 (January 2010)
List of open access contemporary literature are regularly given to students before each session
Existing Templeman Library research journal provision will be used for this module, with occasional Document Delivery service.

Pre-requisites

None

Synopsis *

The practice of reproductive medicine is underpinned by a scientific basis stretching back hundreds of years. New discoveries are being put into medical practice on a regular basis and reproductive medicine research is well known for its translational element. This module will explore the fundamentals of reproductive medicine, Obstetrics, Gynaecology, Urology, Andrology, Managing abnormal pregnancies and pre-term birth, Infectious diseases affecting reproduction, Sex determination, reproductive endocrinology, cancer and fertility, causes of infertility and Genetics. This module will be science-based, informed and led by the scientific and medical literature and modern discoveries.

BI842		The IVF World				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	100% Coursework	
2	Tri-C Academy Dubai	Spring	M	15 (7.5)	100% Coursework	
2	Canterbury	Spring	M	15 (7.5)	100% Coursework	

Contact Hours

Total contact hours: 45
Private study hours: 105
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
A broad knowledge and understanding of clinical and scientific aspects of IVF treatment as outlined in the course content.
The ability to search, synthesise and evaluate the scientific and medical literature pertaining to IVF.
The ability to analyse and evaluate unfamiliar scenarios and apply the knowledge gained in unfamiliar situations.
Competent practical skills similar to those practised by a clinical embryologist, (albeit using model organisms).
The ability present their skills as a well-presented laboratory notebook.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have:
An ability to search primary texts as well as secondary sources and marshal information effectively.
A critical, analytical perspective of the medical literature.
Some independence of thought and originality in the presentation of a scientific document.
The ability to reference the scientific and medical literature properly and present a bibliography in a means consistent with a scientific document.
The ability to present a range of media (graphs, tables, figures, video, large datasets etc.) in an appropriate fashion.
The ability to give a competent scientific presentation.

Method of Assessment

30% - in-course assessment assignment of practical competences
70% - the quality of the reflective log and individual short tests e.g. media calculations, semen analysis, embryo grading, patient leaflet, mini-essay (1500 words), and final test (tests and calculations typically are from 20min – 1 hour)

Preliminary Reading

A Textbook of In Vitro Fertilization and Assisted Reproduction: The Bourn Hall Guide to Clinical and Laboratory Practice: Includes Bourn Hall Protocols on CD-ROM. Peter R. Brinsden Informa Healthcare; 3rd edition (August 12, 2005)
Students are given extra, current, reading lists in-course

Pre-requisites

None

Synopsis *

Around 1-2% of all babies in the UK are born by IVF, with varying figures in many other countries. Internationally, reproductive medicine generally, and IVF in particular, is an area in which the UK is world leading. This module will explore the many aspects of practical IVF (including ICSI, and PGD) and the factors that affect it. A feature of the module will be the presentation of similar issues from different perspectives e.g. that of the clinician, the counsellor and the laboratory manager.

A career as a scientist in reproductive medicine (e.g. clinical embryologist) is a popular path. Although the proposed module does not aim to address the specific goal of training prospective clinical embryologists in how to perform their operational tasks (such training is provided in-house in a highly regulated clinical environment and leads to a vocational qualification), this module will give students a realistic expectation of the likelihood of them excelling in, and enjoying, this popular career path. This module will thus explore the basics of lab technique and good practice, pipette making, egg collection and in-vitro maturation, sperm assessment, insemination, ICSI, embryo grading, assisted hatching, spreading and preimplantation diagnosis. For obvious reasons embryos from non-human model species (e.g. mouse, bovine, pig) will be used.

BI845 MSc Project

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
3	Canterbury	Whole Year	M	60 (30)	100% Project	

Contact Hours

Total contact hours: 440 hours of laboratory time is available for students. The time used will depend on the nature of the project. In addition, there will be regular supervisory meetings and/or research group meetings.
Private study hours: Up to 600, depending on the balance of laboratory and non-laboratory work. This will depend on the project topic itself.
Total study hours: 600

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
How to design a project based around specific research questions and hypotheses.
How appropriate technologies may be applied/adapted to address specific research questions and hypotheses.
How to design and execute experimental and/or analytical approaches to address specific research questions and hypotheses.
How to record experimental and/or analytical procedures and data appropriately.
How to present research in an appropriate, concise, informative and lucid style in keeping with high impact factor scientific journals and conference poster presentations.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Interpret their own laboratory data and/or data from other sources, obtain and interpret information from published sources, critically evaluate their own research and that of others.
Organise information clearly, present information in oral and written form, and adapt their presentation for different audiences.
Use appropriate technology to retrieve, analyse and present scientific information.
Work both independently and as part of a research group.
Demonstrate self-motivation and independence, including time and workload management in order to meet personal targets and imposed deadlines.

Method of Assessment

Poster (20%)
Dissertation (6,000 words: 80%)

Preliminary Reading

Required reading will be research project-dependent. Existing Templeman Library research journal provision will be sufficient for this module, with occasional Document Delivery service.

Pre-requisites

None

Synopsis *

Students will undertake an independent research project that will be designed by the student, in consultation with an academic supervisor, to address specific research questions. Students will be trained in key techniques relating to the project, and will work independently under the supervisor's guidance to design and execute experiments that will address the questions formulated earlier.

During the Spring term, students are assigned to supervisors by the project co-ordinators (members of academic staff, generally the co-ordinators of the individual MSc-T programmes). Students then meet with their project supervisor to discuss the general subject matter of the project and obtain guidance on background reading, following which the student and supervisor work together to design the project. Orientation sessions are provided covering laboratory health and safety and research ethics.

The research activities take place in the Summer term and vacation. Students are expected to dedicate 600 hours to their project work. Of this time, students taking "wet-lab" projects will spend at least 11 weeks working full time in a laboratory setting planning, carrying out and documenting experiments, with the remainder of the time allocated to background reading and report writing. There are informal opportunities to discuss the project work and relevant literature with the supervisor and other laboratory staff on an ongoing basis. Formal meetings may be arranged at the discretion of the student and supervisor.

Students undertaking "dry-lab" projects analyse published information (e.g. literature, databases) or unpublished data sets are expected to spend the same amount of time on their projects as "wet-lab" students. "Dry-lab" students are expected to meet with their supervisor at least once a week to discuss progress and ideas and to resolve problems.

At the end of the formal project time, students are allowed time to complete the final project report, although they are encouraged to start writing as early as possible during the Summer term. The supervisor provides feedback on content and style of a draft of the report, which should be in the style of a scientific report for publication in an appropriate scientific journal. In addition, students are expected to deliver their findings as a poster in a symposium organised by the School.

BI851 Advanced Molecular Processing for Biotechnologists and Bioengineers

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

Contact Hours

Total contact hours: 62
Private study hours: 238
Total study hours: 300

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
An overview of knowledge and understanding of key drivers and principles in drug design, systems biology, synthetic biology, bioenergy, cell engineering, bionanomaterials and protein/vaccine based drugs and their application to industrial biotechnology and bioengineering.
Practical experience of modern cell engineering and synthetic biology approaches.
Experimental design within a biotechnological and bioengineering research context.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have:
Communication: ability to organise information clearly, present information in oral and written form, adapt presentation for different audiences including academic and industrial.
Analytical skills: interpretation of data, marshalling of information from published sources, critical evaluation of own research and that of others.
Team work: the ability to work both independently and as part of a research group using peer support, diplomacy and collective responsibility.
Self-motivation and independence: time and workload management in order to meet personal targets and imposed deadlines.
Information technology: use of appropriate technology to retrieve, analyse and present scientific information.
Scientific writing: ability to interpret and critique the findings of others and collectively develop an opinion in an area, communicating this via the presentation of theories and ideas in a review format.

Method of Assessment

Poster Assignment (20%)
Laboratory Practical Assignment (10%)
Journal Club Presentation (20%)
Mini Review Assignment, 3000 words maximum (40%)
Laboratory Practical Assignment (10%)

Preliminary Reading

The reading list will largely be the latest review and primary research articles in this area, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for receiving appropriate journal articles to which we already have access. Two key Journals will be Nature Biotechnology and Biotechnology and Bioengineering. Many basic biochemistry text books within the Library also cover much of the material which will be delivered.

Pre-requisites

None

Synopsis *

This module will consider key areas of biotechnology and bioengineering including an introduction to drug discovery and design, systems biology and synthetic biology, gene expression and the engineering of cells to modulate cellular processes, the mechanics of cells from an engineering perspective, industrial biotechnology (specifically biofuels and small molecule systems biology), protein and vaccine based drugs, regenerative medicine and bionanomaterials. This will be delivered through workshops and seminars by specialists within the CMP and involve a number of course work assignments that will consider the most current research and thinking in these areas. This will be complemented by two three day practicals, one on mammalian cell engineering and the other on synthetic biology.

BI852 Advanced Analytical and Emerging Technologies for Biotechnology and Bio

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

Contact Hours

Total Contact Hours: 60
Total Private Study Hours: 240
Total Study Hours: 300

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate broad knowledge and understanding of key analytical technologies used in the analysis of cell-based expression systems in the biotechnology and bioengineering field.
Demonstrate practical experience of modern analytical technologies utilised in academia and industry in the field.
Display a fundamental understanding of the principles underlying spectroscopic, chromatographic, sequencing, microscopy, and physical methods of analysis.
Demonstrate confidence when interpreting data from analytical analysis of products and samples.
Demonstrate an assured ability to design appropriate analytical experiments to answer questions to be addressed.
Demonstrate an appreciation of the importance of analysis for quality assurance, process monitoring and fundamental understanding of biological systems.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate an ability to organise information clearly, present information, and adapt presentation for different audiences including academic and industrial.
Demonstrate confidence in interpreting data, marshal information from published sources, critically evaluate their own research and that of others.
Demonstrate effective time and workload management in order to meet personal targets and imposed deadlines.
Demonstrate use of appropriate technology to retrieve, analyse and present scientific information.

Method of Assessment

Data Handling and Interpretation (6-10 pages, including calculations/data handling/supporting material) – 25%
Practical and Write-up (approx. 6 pages, including tables and figures)– 30%
Presentation (10 minutes) – 25%
In-Course Test (45 minutes) – 20%

Preliminary Reading

The reading list will largely be the latest review and primary research articles in this area, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases, they will be set tasks for receiving appropriate journal articles to which we already have access. Key Journals will be Nature Biotechnology, Analytical Chemistry, Analytical Biochemistry, Biotechnology and Bioengineering, and Genetic Engineering News to which the students can subscribe free of charge. Many basic biochemistry and chemistry textbooks within the Library also cover much of the material which will be delivered.

Pre-requisites

None

Synopsis *

This module considers key areas of analytical technologies used for the analysis of proteins, small molecules and cells. This will include mass spectrometry techniques (GC-MS, ESI-MS, MALDI-ToF MS), crystallography and NMR, spectroscopy (UV-vis, IR, Raman, fluorescence, ESR), chromatography, DNA and RNA sequencing, bioinformatics, microscopy (AFM, EM), electrophoresis, (qRT)-PCR, 'omics' approaches, glycosylation profiling, cell based assays, simple fermentation control and measurements. Industrial case studies will be covered to demonstrate how different techniques and approaches are integrated in a commercial environment. Students will also be expected to design and implement a protocol aim at recovering and characterising a protein molecule from mammalian cell culture within set constraints and parameters. There will also be a visit to an industrial analytical laboratory to demonstrate such technologies in the work place. This will be delivered through workshops and seminars by specialists within the Industrial Biotechnology Centre (IBC) and involve a number of course work assignments that will consider the most current research and thinking in these areas. This will be complemented by a one week practical where the students are asked to design a process to purify and characterise a molecule and then use this to setup a crystallisation screen.

BI853 Bacterial Pathogens

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
3	Canterbury	Spring	M	15 (7.5)	60% Coursework, 40% 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 systematic understanding of and a critical awareness of current problems and/or new insights related to bacterial pathogens.
Demonstrate comprehensive understanding of techniques applicable to bacterial pathogen research.
Understanding how our current knowledge impacts upon future research to combat the spread of bacterial infections.
Critically evaluate current research in the field of bacterial pathogens and to evaluate methodologies/research findings and develop critiques of them.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Organise information clearly and present information for different audiences.
Interpret data, marshal information from published sources, and critically evaluate own research and that of others.
Work both independently and as part of a research group using peer support, diplomacy and collective responsibility.
Manage time and workload in order to meet personal targets and imposed deadlines.
Use appropriate technology to retrieve, analyse and present scientific information.

Method of Assessment

Assignment – computer workshop (30%)
Assignment – 10 minute presentation (30%)
Exam - 2h (40%)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for receiving appropriate journal articles to which we already have access.

Pre-requisites

None

Synopsis *

The module aims to develop an in depth understanding of bacterial pathogens, based around lectures and interactive workshops. Key topics include Gram-negative pathogens (e.g. E. coli, Pseudomonas), Gram-positive pathogens (e.g. Staphylococcus aureus, Bacillus anthracis, Mycobacterium tuberculosis), current and emerging virulence traits (e.g. adhesion, invasiveness, enhanced spread, toxin production, antimicrobial drug resistance). The module will involve a rotation of seminars covering key theoretical concepts, mechanistic insights into host:pathogen interactions, and discussion of practical approaches to combat the spread of bacterial infections. These will be accompanied by interactive workshops wherein students will analyse, present and discuss the relevant research literature. In addition, a computer workshop will provide bioinformatics training for the analysis of genomic traits pertaining to bacterial virulence. The students will gain experience in scientific design, literature analysis, scientific communication and the analysis and interpretation of complex experimental data.

BI854 Fungi as Human Pathogens

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	60% Coursework, 40% 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:
Have:
A systematic understanding of and a critical awareness of current problems and/or new insights related to fungal pathogens.
A comprehensive understanding of techniques applicable to fungal pathogen research.
Understanding how our current knowledge impacts upon future research to combat the spread of fungal infections.
An ability to critically evaluate current research in the field of fungal pathogens and to evaluate methodologies/research findings and develop critiques of them.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have:
Communication: ability to organise information clearly, present information in oral and written form, adapt presentation for different audiences.
Analytical skills: interpretation of data, marshalling of information from published sources, critical evaluation of own research and that of o.
Team work: the ability to work both independently and as part of a research group using peer support, diplomacy and collective responsibility.
Self-motivation and independence: time and workload management in order to meet personal targets and imposed deadlines.
Information technology: use of appropriate technology to retrieve, analyse and present scientific information.

Method of Assessment

Assignment (25%). Assessment consists of 7 questions. 4 questions require a concise (yes/no) answer or a numerical answer. 3 questions require a short written essay with the following word limit: Q3: 300 words; Q6: 200 words; Q7: 350 words.
Presentation (25%)
Assignment (10%) Word Limit: 1000 words including figure legends
Exam (40%)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases, they will be set tasks for receiving appropriate journal articles to which we already have access.

Pre-requisites

None

Synopsis *

The module aims to develop an in depth understanding of fungal pathogens, based around lectures and interactive workshops. Key topics include severe, recurrent and chronic fungal diseases (such as cryptococcal meningitis, candidiasis and chronic pulmonary aspergillosis).and molecular mechanisms underlying resistance to anti-fungal drugs. The module will involve a rotation of seminars covering key theoretical concepts, mechanistic insights into host:pathogen interactions, and discussion of practical approaches to combat the spread of fungal infections. These will be accompanied by interactive workshops 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 and interpretation of complex experimental data.

BI855 Advances in Parasitology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	60% Coursework, 40% 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:
Have:
A systematic understanding of and a critical awareness of current problems and/or new insights related to eukaryotic pathogens.
A comprehensive understanding of techniques applicable to research involving parasites.
An understanding how our current knowledge impacts upon future research to combat the spread of parasitic infections.
An ability to critically evaluate current research in the field of parasitology and to evaluate methodologies/research findings and develop critiques of them.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have:
Communication: ability to organise information clearly, present information in oral and written form, adapt presentation for different audiences.
Analytical skills: interpretation of data, marshalling of information from published sources, critical evaluation of own research and that of others.
Teamwork: the ability to work both independently and as part of a research group using peer support, diplomacy and collective responsibility.
Self-motivation and independence: time and workload management in order to meet personal targets and imposed deadlines.
Information technology: use of appropriate technology to retrieve, analyse and present scientific information.
Practical skills: use of appropriate tools and laboratory techniques to retrieve scientific information.

Method of Assessment

Assignment (10%) – 2000 words
Presentation (25%)
Assignment (25%)
Exam (40%) – 2 hours

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases, they will be set tasks for receiving appropriate journal articles to which we already have access.

Pre-requisites

None

Synopsis *

The module aims to develop an in depth understanding of eukaryotic pathogens, based around lectures and interactive workshops. Key topics include: Introduction to parasitology (parasitism as a strategy), Evolution and taxonomy of parasitic protozoa, Cell structures and functions, Molecular biology of parasitic protozoa, The unique biochemistry of parasitic protozoa, Apicomplexa (Plasmodium, Toxoplasma, Babesia, Cryptosporidium), Parasitic Excavates (Trypanosoma, Leishmania, Naegleria, Trichomonas), Overview of medically important helminths, Host-parasite-vector immune interactions. The module will involve a rotation of seminars covering key theoretical concepts, mechanistic insights into host: pathogen interactions, and discussion of practical approaches to combat the spread of parasitic infections. These will be accompanied by interactive workshops wherein students will analyse, present and discuss the relevant research literature. In addition, a laboratory workshop will provide training for the identification of medically important parasites using microscopy and molecular biology techniques. The students will gain experience in scientific design, literature analysis, scientific communication and the analysis and interpretation of complex experimental data.

BI856 Viral Pathogens

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

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 understanding of key principles in virology.
Critical understand modern virology and its application to solve research problems.
Apply principles ofexperimental design within a biological research context.
Critical interpretbiological data.
Organise and present experimental data.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Organise information clearly and present information for different audiences.
Interpret data, marshal information from published sources, and critically evaluate own research and that of others.
Work both independently and as part of a research group using peer support, diplomacy and collective responsibility.
Manageime and workload in order to meet personal targets and imposed deadlines.
Use appropriate technology to retrieve, analyse and present scientific information.

Method of Assessment

Written assessment (News and Views Article, 1,500 words) (60%)
Presentation (15 minutes, 40%)

Preliminary Reading

The reading list will be research articles from key scientific journals that address virology, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for receiving appropriate journal articles to which we already have access.

Pre-requisites

None

Synopsis *

The module aims to 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 complex experimental data.

BI859 Practical Molecular Biology and Genome Editing

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

Contact Hours

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

Learning Outcomes

1. Understand key principles in molecular biology and their cutting edge developments.
2. Undertake practical modern molecular biology and genome editing, and its application to solve discipline-specific research problems.
3. Design hypothesis-driven experimental research within a biological research context.

Method of Assessment

Lab report (4,000 words) (100%)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for retrieving appropriate journal articles to which we already have access.

Synopsis *

The module aims to develop understanding and practical skills in molecular biology, based around interactive workshops, practical sessions and group work. The module will involve practical sessions covering key practical and transferable skills in molecular biology and biotechnology. The module will feature an extended mini-project focused on CRISPR-Cas9-based genome editing - a cutting-edge technology with wide application in the biological sciences – alongside presentation of findings in extended written report format to provide experience of the dissemination platform widely used in biological research.

BI860 Research, Ethics and Impact

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

Contact Hours

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

Learning Outcomes

1. Demonstrate critical understanding of the engagement of scientists with different public, private and professional stakeholders.
2. Place current biological research and advanced scholarship within an ethical context.
3. Demonstrate systematic knowledge and understanding of the global impact of discipline-specific research.

Method of Assessment

Essay (1,500 words) (30%)
Scientific blog, covering topical science for a public audience (2,500 words) (70%)

Preliminary Reading

J. Gregory, S. Miller, Science in Public: Communication, Culture and Credibility (Perseus, US, 2000)

Synopsis *

Science has a profound influence on public life. This module considers the ways in which different professional and public groups interact with science and scientists, and how this influences the work that scientists do. It considers the social roles and responsibilities of scientists beyond their own scientific research, the context in which science operates, and the careers that exist for scientists outside of the traditional laboratory environment. In considering specific scientific developments in light of ethics, policy, media and public perception, the module will develop a range of academic skills that support learning in more specialised modules. It also provides transferable skills valued in the science sector, particularly science communication.

BI861 Research Skills in Cancer Biology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	M	15 (7.5)	100% Coursework with Pass/Fail Elements	

Contact Hours

Total contact hours: 22
Private study hours: 128
Total study hours: 150

Learning Outcomes

1. Understand, critically appraise and analyse research data
2. Understand and apply computational and bioinformatics techniques to research questions
3. Place widely-applied research skills in a subject-specific context of cancer biology

Method of Assessment

Bioinformatic assessments associated with online workshops (Pass/Fail)
Peer Review Assignment (50%)
Journal club presentation (50%)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for retrieving appropriate journal articles to which we already have access.

Synopsis *

This module will develop the advanced research skills that are required in modern biological research and transferable across biological research disciplines. This will include the development of skills in bioinformatics, statistical analysis, research publication and peer review through a combination of online exercises, seminars and group work. These skills will be discussed, enhanced and contextualised in tutorials that consider their application of these skills through consideration of literature and case studies drawn from the field of cancer biology.

BI862 Pathogen Diagnosis, Therapeutics and Vaccines

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

Contact Hours

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

Learning Outcomes

1. A systematic understanding of and a critical awareness of current problems and/or new insights related to pathogen diagnosis, therapeutics and vaccines.
2. A comprehensive understanding of techniques applicable to study pathogen diagnosis, therapeutics and vaccines.
3. An understanding how our current knowledge impacts upon future research to develop new approached for pathogen diagnosis, therapeutics and vaccines.
4. An ability to critically evaluate current research in the field of pathogen diagnosis and vaccination and to evaluate methodologies/research findings and develop critiques of them.

Method of Assessment

Presentation (30%)
Project Report (2,500 words) (70%)

Preliminary Reading

The reading list will be comprised of research articles, which will be used to drive a case-study based approach to learning.

Synopsis *

As recent outbreaks of infectious diseases have illustrated, it is imperative to develop rapid diagnostics, effective therapeutics and new vaccines to combat emerging infections that are difficult to treat. This module will cover the approaches used in pathogen diagnosis as well as the cutting edge therapeutics available for the treatment of infectious diseases. The module will also focus on the biotechnological aspects of vaccine development.

BI863 Research Skills in Infectious Diseases

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	M	15 (7.5)	100% Coursework with Pass/Fail Elements	

Contact Hours

Total contact hours: 22
Private study hours: 128
Total study hours: 150

Learning Outcomes

1. Understand, critically appraise and analyse research data
2. Understand and apply computational and bioinformatics techniques to research questions
3. Place widely-applied research skills in a subject-specific context of infectious disease

Method of Assessment

Bioinformatic assessments associated with online workshops (Pass/Fail)
Peer Review Assignment (50%)
Journal club presentation (50%)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for retrieving appropriate journal articles to which we already have access.

Synopsis *

This module will develop the advanced research skills that are required in modern biological research and transferable across biological research disciplines. This will include the development of skills in bioinformatics, statistical analysis, research publication and peer review through a combination of online exercises, seminars and group work. These skills will be discussed, enhanced and contextualised in tutorials that consider their application of these skills through consideration of literature and case studies drawn from the field of infectious disease research.

BI864 Research Skills in Biotechnology

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	M	15 (7.5)	100% Coursework with Pass/Fail Elements	

Contact Hours

Total contact hours: 22
Private study hours: 128
Total study hours: 150

Learning Outcomes

1. Understand, critically appraise and analyse research data.
2. Understand and apply computational and bioinformatics techniques to research questions.
3. Place widely-applied research skills in a subject-specific context of biotechnology.

Method of Assessment

Bioinformatic assessments associated with online workshops (Pass/Fail)
Peer Review Assignment (50%)
Journal club presentation (50%)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for retrieving appropriate journal articles to which we already have access.

Synopsis *

This module will develop the advanced research skills that are required in modern biological research and transferable across biological research disciplines. This will include the development of skills in bioinformatics, statistical analysis, research publication and peer review through a combination of online exercises, seminars and group work. These skills will be discussed, enhanced and contextualised in tutorials that consider their application of these skills through consideration of literature and case studies drawn from the field of biotechnology.

BI865 Research Skills in Reproductive Medicine

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	M	15 (7.5)	100% Coursework with Pass/Fail Elements	

Contact Hours

Total contact hours: 22
Private study hours: 128
Total study hours: 150

Learning Outcomes

1. Understand, critically appraise and analyse research data.
2. Understand and apply computational and bioinformatics techniques to research questions.
3. Place widely-applied research skills in a subject-specific context of reproductive medicine.

Method of Assessment

Bioinformatic assessments associated with online workshops (Pass/Fail)
Peer Review Assignment (50%)
Journal club presentation (50%)

Preliminary Reading

The reading list will be research articles, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for retrieving appropriate journal articles to which we already have access.

Synopsis *

This module will develop the advanced research skills that are required in modern biological research and transferable across biological research disciplines. This will include the development of skills in bioinformatics, statistical analysis, research publication and peer review through a combination of online exercises, seminars and group work. These skills will be discussed, enhanced and contextualised in tutorials that consider their application of these skills through consideration of literature and case studies drawn from the field of reproductive medicine.

BI866 Biology of Global Pathogens

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

Contact Hours

Total contact hours: 23
Private study hours: 127
Total study hours: 150

Learning Outcomes

1. A systematic understanding of and a critical awareness of current problems and/or new insights related to molecular pathogenesis.
2. A comprehensive understanding of techniques applicable to microbial pathogen research.
3. An understanding how our current knowledge impacts upon future research to combat the spread of microbial infections.
4. An ability to critically evaluate current research in the field of microbial pathogens and to evaluate methodologies/research findings and develop critiques of them.

Method of Assessment

Journal club presentations (30%)
Exam (70%)

Preliminary Reading

The reading list will be comprised of research articles, which will be used to drive a case-study based approach to learning.

Synopsis *

As microbial pathogens pose an increasing threat to human health, it is imperative to improve our fundamental understanding of how these organisms survive during infection and cause disease. This module will cover the molecular pathogenicity of a variety of globally important microbial pathogens, and will provide students with the ability to critically analyse the molecular mechanisms that enable certain key pathogens to cause disease. Examples may be drawn from bacteria, fungi, viruses and/or eukaryotic parasites.

BI867 Outbreaks, Epidemics and Pandemics

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

Contact Hours

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

Learning Outcomes

1. A systematic understanding of and a critical awareness of current problems and/or new insights related to outbreaks, epidemics and pandemics.
2. A comprehensive understanding of techniques applicable to epidemiological research.
3. An understanding how our current knowledge impacts upon future research to combat the spread of microbial infections.
4. An ability to critically evaluate current research in the field of epidemiology and to evaluate methodologies/research findings and develop critiques of them.

Method of Assessment

Computer practical (30%)
Exam (70%)

Preliminary Reading

The reading list will be comprised of research articles, which will be used to drive a case-study based approach to learning.

Synopsis *

As COVID-19 has clearly demonstrated, there is an urgent need to improve our understanding of disease outbreaks and how to mitigate their impact upon human health. This module will cover the fundamentals of epidemiology, including the theory and practical approaches to study disease outbreaks. High profile examples will be analysed in terms of their human impact and disease tracking, and aspects of public health strategies and policy will be addressed.

BI868 Infection and Antimicrobial Resistance

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

Contact Hours

Total contact hours: 23
Private study hours: 127
Total study hours: 150

Learning Outcomes

1. A systematic understanding of and a critical awareness of current problems and/or new insights related to infection and antimicrobial resistance.
2. A comprehensive understanding of techniques applicable to infection and antimicrobial resistance.
3. An understanding how our current knowledge impacts upon future research to combat the spread of resistant microbial infections.
4. An ability to critically evaluate current research in the field of antimicrobial resistance and to evaluate methodologies/research findings and develop critiques of them.

Method of Assessment

Journal club presentation (30%)
Exam (70%)

Preliminary Reading

The reading list will be comprised of research articles, which will be used to drive a case-study based approach to learning.

Synopsis *

As we face the threat of a post-antimicrobial era, it is of paramount importance that we understand the mechanisms of antimicrobial resistance in the context of infection. This module will cover the fundamentals of clinical microbiology, antimicrobials and their targets, mechanisms underpinning antimicrobial resistance, and the host:pathogen interactions that influence antimicrobial efficacy.

BI870 Molecular Cytogenetics and Preimplantation Genetic Testing

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

Contact Hours

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

Learning Outcomes

1. Demonstrate a broad knowledge and understanding of clinical and scientific aspects Molecular Cytogenetics and Preimplantation Genetic Testing (PGT) as outlined in the course content.
2. Demonstrate the ability to search, synthesise and evaluate the scientific and medical literature pertaining to PGT.
3. Demonstrate the ability to analyse and evaluate unfamiliar scenarios and apply the knowledge gained in unfamiliar situations.
4. Demonstrate confident practical skills like those practised in the world of PGT and molecular cytogenetics.
5. Demonstrate the ability to record their practical skills and findings and present them as a well organised laboratory notebook.

Method of Assessment

* In-Course Test x 6 (10 minutes each) – 20%
* Reflective Log (1,000 words) – 20%
* Karyotyping Test (60 minutes) – 20%
* Presentation (15 minutes) – 20%
* Final Test (45 minutes) – 20%

Both the karyotyping test and the presentation are compulsory sub-elements and must be passed to complete the module

Preliminary Reading

Griffin, D.K. and Harton, G.L., eds. (2020). Preimplantation Genetic Testing: Recent Advances in Reproductive Medicine. Boca Raton, London, New York: CRC Press.
Kuliev, A Rechitsky, S., and Simpson, J.L. (2020). Practical Preimplantation Genetic Testing. Cham: Springer.

Synopsis *

The aim of this module is to give students a basic understanding of molecular and cytogenetic techniques and their applications in the field of clinical diagnosis e.g. for infertility or prenatal diagnosis and biological research. Throughout the course there will be both theoretical and practical elements to the course enabling them to have hands-on experience with molecular cytogenetic tools. Students will be examined on both theoretical and practical elements to assess hands-on skills and understanding of the techniques involved. They will be provided with a lab book in which they should take notes during each of the sessions, the quality of this will also be assessed.

BI871 Biotechnology in Action

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
1	Canterbury	Autumn	M	15 (7.5)	100% Coursework with Pass/Fail Elements	

Contact Hours

Total Contact Hours: 22
Total Private Study Hours: 128
Total Study Hours: 150

Learning Outcomes

1. Demonstrate critical and systematic knowledge and understanding of the biotechnology sector and its impact on sustainable development.
2. Demonstrate reflective consideration of their current and future role within the biotechnology industry.
3. Demonstrate an ability to identify current trends and advanced research findings in biotechnology and how these might be translated into application.
4. Recognise the range of scientific career structures in the biotechnology sector.

Method of Assessment

* Reflective Written Assignment (2,000 words) – 50%
* Essay (2,000 words) – 50%
* Presentation (10 minutes) – Pass/Fail

Both the reflective writing assignment and the presentation are compulsory sub-elements and must be passed to complete the module.

Preliminary Reading

Generally, the reading list will consist of the latest scientific reviews and published papers in the area. Additional indicative reading may include:

Khoobchandani, M. and Saxena, A. (2019). Biotechnology Products in Everyday Life (EcoProduction) 1st Edition. Cham, Switzerland: Springer International.
Shimasaki, C.D.D. (2014). The Business of Bioscience: What goes into making a Biotechnology Product. New York: Springer-Verlag.
Simon, F. and Giovannetti, G. (2017). Managing Biotechnology from Science to Market in the Digital Age. New Jersey: John Wiley & Sons.
Thieman, W.J. and Palladino, M.A. (2019). Introduction to Biotechnology. Fourth Edition; Global edition. London: Pearson Education.
Wittmann, C. and Liao, J. (2017). Industrial Biotechnology Products and Processes. New Jersey: Wiley.

Synopsis *

This module provides students with critical perspectives on the biotechnology. With a focus on the biotechnology industry, the module encourages students to harness scientific knowledge in an industrial biotechnology context, considering the transition from promising research findings into application. Specific examples will demonstrate development of findings into commercial application and the process and regulatory structure within which this takes place. Application of new scientific approaches and techniques into biotechnology and regulatory acceptance will be covered. The latest scientific developments in the wider biotechnology field in the literature will also be examined and how these might impact the field in the future. The role of biotechnology in addressing local and global health, social, economic, and environmental challenges as aligned with the UN sustainable development goals will be considered. The module provides perspective from external speakers in the biotechnology sector, providing professional insights and networking opportunities.