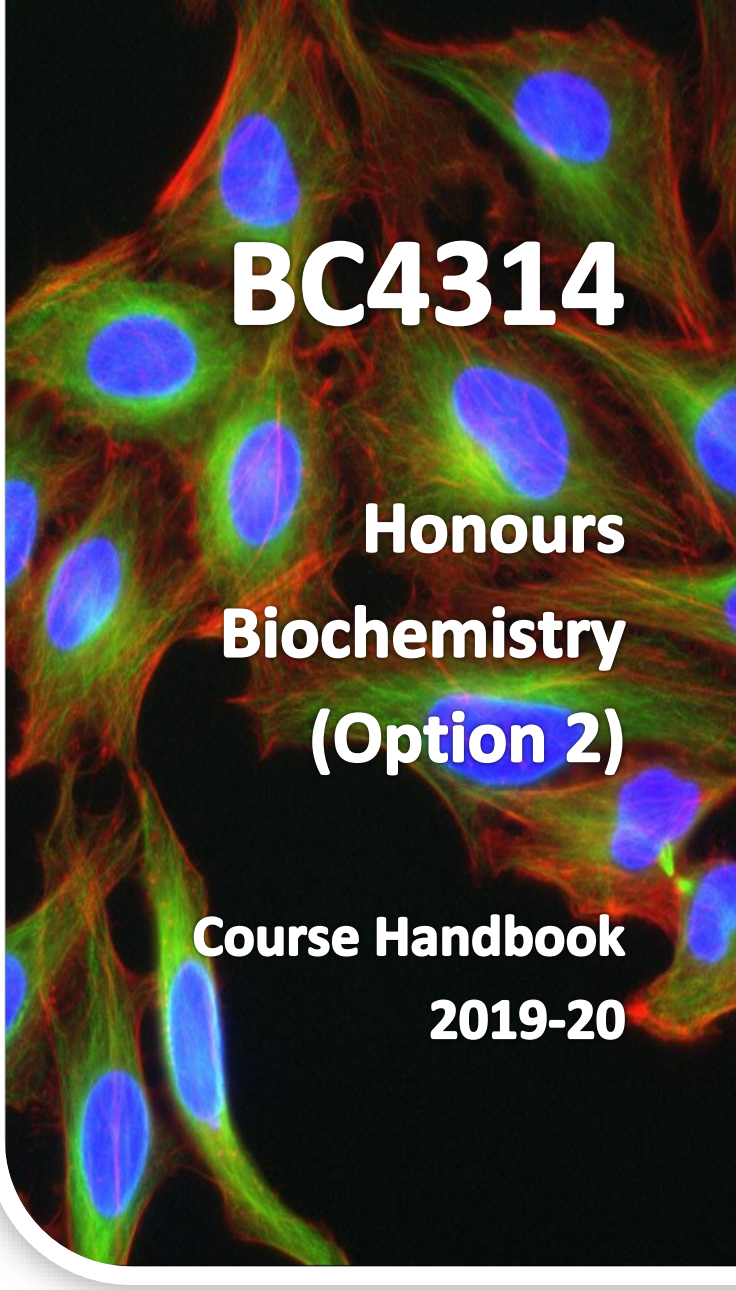
School Of Medicine, Medical Sciences & Nutrition



BC4314

Honours Biochemistry (Option 2)

Course Handbook

2019-20

UNIVERSITY OF ABERDEEN

Contents

Cover image:

Confocal micrograph of fluorescently labelled HeLa cells.

Nuclei are labelled in blue, tubulin in green and actin fibres in red.

Courtesy of:

Kevin Mackenzie
Microscopy and Histology Core Facility
Institute of Medical Sciences
University of Aberdeen
http://www.abdn.ac.uk/ims/microscopy-histology

Course Summary

Biochemistry is profoundly influencing our understanding of human biology and of medicine in a number of ways. This involves the molecular explanation of events occurring during development and in disease. A clear understanding of these biochemical processes opens ways to a rational design of methods for preventing and treating the illness. In this course, the molecular changes involved in cancer, the second highest cause of death in the UK will be explored. This will be complemented by insight into how stem cells, a cell type that is critical for development and function, differ from normal somatic cells. You will build on previous knowledge of biochemistry, molecular and cell biology to further develop your understanding of these important aspects of human development and health.

Course Aims & Learning Outcomes

The subject-specific learning outcomes are such that, at the end of the course, students should be able to:

- use examples to analyse the molecular mechanisms underlying the subversion a of human biochemistry in tumour cells and other diseases;
- describe the properties of stem cells and how they contribute to development and disease.

Course Teaching Staff

Course Co-ordinator(s):

Dr Berndt Müller (**b.mueller@abdn.ac.uk**)

Other Staff:

Prof Anne Donaldson (**a.d.donaldson@abdn.ac.uk**)
Dr Shin-ichiro Hiraga (**s.hiraga@abdn.ac.uk**)
Dr Anke Roelofs **(a.roelofs@abdn.ac.uk**)
Prof Valerie Speirs (**valerie.speirs@abdn.ac.uk**)

Assessments & Examinations

This course is assessed via a written examination (worth 70% of the overall course grade) in the May exam diet and one piece of continuous assessment (worth 30% of the overall course grade).

The continuous assessment associated with this course is detailed below, with two other pieces of work being associated with your other “Option” course and the “Core” course.

It is vital that the deadlines for your continuous assessments are adhered to. Submit an incomplete piece of work rather than miss a deadline. Work not submitted on time will not be accepted unless accompanied by either a medical certificate or a written explanation justifying this.

A complete submission of your work consists of:

- uploading an electronic copy of the work via MyAberdeen before 12 NOON on the deadline date.

The deadlines for all three pieces of work are:

- Core course Research Perspective: 12 NOON, Monday 30th September.
- Option 1 course Research Tutorial Spotlight: 12 NOON, Monday 4th November.
- **Option 2 course Essay: 12 NOON, Monday 2nd December.**

Research Essay

The essay title will be announced through MyAberdeen.

You are welcome to use subheadings to structure the essay as you see fit, but the following should be included on a title page.

- *Title* (do not modify the title from above)
- *Name*
- *Student ID*
- *Word Count*

Word limit for your Research Essay is **2,000 words** and you can use as many appropriate figures/tables as you wish. The word limit does not include text in tables, figure legends, or references.

Scientific Writing

Writing is an important scientific skill. Its function in the Honours courses is to provide you with training in finding, reading, analysing and communicating scientific ideas. Although it is usually necessary to start your reading from reviews that provide an expert overview of a topic, it is critical to your development that you read a significant number of original papers that describe the experiments underpinning key scientific advances. Central to these skills is the development of the ability to judge the important points made in a paper and what are

the central pieces of evidence that support those points. Finally, it is important for all graduates to have a working knowledge of the key experimental procedures and techniques that generate the data that we use to test hypotheses.

Word Limit: Adhering to a word limit (excluding figure legends, tables and the reference list) requires you to be disciplined in the preparation of the piece of work; being able to write to a required length is a very useful skill, so we expect you to stay within the limit set. Your computer will give you a word count; this must be included at the end of the work submitted. **We reserve the right to return work exceeding the word count for shortening. Submissions returned for shortening must be re-submitted within 24 h**. Having to resubmit your work again will delay marking and subsequent feedback.

Assessment: The continuous assessment for Honours will be assessed by two members of staff, using criteria that will be published in MyAberdeen alongside the submission links for each piece of work. This assessment is not open to negotiation, although if asked, the markers will clarify any points of constructive criticism. Please use the assessment criteria as a guide and read them with care; the notes on scientific writing also give you guidance on what we judge to be important in a well-written piece of work. If you have particular doubts about your ability to write scientifically, either in terms of organising material or in the mechanics of good scientific writing, seek help from a member of staff or the Honours Coordinators during the first term. Do not wait until your first assignment is causing you anxiety.

All submissions should make reference to the latest literature on the subject you have chosen. While you may be guided through an unfamiliar subject area by reference to a review, **your work should specifically not paraphrase the review article**, but should be a synthesis of your own views of the subject, **written in your own words** arrived at by reading of the **original research papers** from resources such as Web of Science/Medline/PubMed/Google Scholar. This will give insight into *how* information is derived (one criteria assessed) as well as helping in preparation for the Data Analysis exam at the end of the year, where understanding of a research paper is tested.

Avoiding Plagiarism

The definition of Plagiarism is the use, without adequate acknowledgement, of the intellectual work of another person in work submitted for assessment. A student cannot be found to have committed plagiarism where it can be shown that the student has taken all reasonable care to avoid representing the work of others as his or her own.

The instruction given above to write assignments **in your own words** and not to copy whole sentences from articles is crucially important to avoid plagiarism.

The University views this offence extremely seriously indeed; it can have dire consequences, including the awarding of no higher than a pass degree.

Continuous assessment assignments and your thesis are all submitted as electronic copies via MyAberdeen so they can be checked for originality. The programme will detect passages of text copied from other sources, and also if sentences from various text sources were used throughout the text, both indicators of plagiarism. MyAberdeen accepts most common formats, but it is advised that you submit your work as **PDF** files to avoid problems with re-formatting of figures and/or text during the submission process. Any evidence of copying from other sources that is detected in your final submissions will be brought to the attention of the Head of School, who will investigate and determine whether cheating has occurred and take the appropriate action.

Feedback

As for all elements of continuous assessment, you will be given feedback on the Honours classification your work has attained, with the grading on the University Common Grading Scale (CGS). Feedback is normally given within 3 weeks of submission.

Guide to Writing

Students should refer to "A Guide to Scientific Writing" by David Lindsay (Longman Cheshire) for more general guidance on writing. What follows is not a substitute for reading this book but gives general guidance on writing and on how we assess your work.

PLANNING YOUR WRITING

Think

- What do I know already?
- Where will I find the information needed to develop my views on this issue?
- Where can I find more information?
- What are the best examples to illustrate the points that I want to make?
- How many words do I devote to each example?

Prepare

- Read a mix of reviews and use these to identify the major original scientific papers that have resulted in our current understanding of the topic.
- Read these papers and make notes on: research strategy use to analyse the problem, key experimental procedures that generate the data and critical controls that validate the data.
- Devise a set of themes and ideas for your work using the core information from above.
- Organise evidence under the theme headings: remember that arguments pro and contra are equally important.
- Select illustrations (diagrams/schemes) that reflect the themes and ideas.

Plan

- Place themes in a logical order, and have a clear, and planned, introduction and conclusion.
- Start simply and develop towards more complex arguments.
- Do not hop from one theme to another and then back again.
- Identify the links between themes as a mechanism of ensuring continuity.

Execute

- Write short sentences and keep clauses simple.
- Use appropriate tenses.
- Be consistent in the organisation of sections.
- Have diagrams in front of you when writing about them.
- Support statements with evidence, usually a citation; ensure your citation style is consistent

Complete

- Read over what you have written - can you read it out loud without stumbling?
- Have you answered the question?
- Have you done what you said you would do at the start of the assignment?
- Have you checked it carefully for typographical errors?

Assessment of Written Work

Every piece of work in your Honours year will be assessed using a standardised assessment form. The assessment forms ensure that you get useful feedback on your written work. The Continuous Assessment form covers the following criteria.

Content and Presentation

Each piece of work will be judged on content and also on style of presentation. More marks are given for the content of the work than are given for the presentation. Look at the structure of the feedback form to see what the priorities are in giving marks. However, remember also that a written piece of work must always be more than a collection of facts and ideas. Good presentation is central to clear communication.

Knowledge: It is expected that any piece of work will contain a substantial body of facts gleaned from appropriate original literature, which should be cited within the text (**Citations**). The length of the work and its intended audience will dictate how many facts can be given in support of a given statement.

Analysis: Students are expected to develop their analytical skills. This is most readily demonstrated by use of carefully selected examples, which should show a good

understanding of the material. Remember that examples may either support or undermine an argument.

Understanding: Students are expected to display a clear grasp of fundamental concepts in the context of the work and their discipline. This is sometimes illustrated by the lack of mistakes about fundamentals of the cell and cellular processes, but it is also expected a student will develop, through their reading, an understanding of the subject area and display this by writing logically about it.

Techniques: Scientific information is derived from experimentation. It is important to understand how information is derived. For example, what technique was used, how was the experiment conducted etc.

Figures: An argument can often be supported by Figures or Tables that present information more effectively than text alone. Figures and Tables should not be an add-on but must be an integral feature of the text and must be described and discussed. A poor or inappropriate figure or table will usually detract from the work. Appropriate figures prepared by hand or using a drawing programme are preferred to reproductions of complex diagrams from other people's work (if used, make sure you acknowledge the source).

Citations: Papers and reviews used as source material should be cited in the text. Direct quotes should be indicated by quotation marks, **although their use should be kept to a minimum, and they must be referenced (see University Web page on plagiarism)**. Use of the **Harvard style of citation** is essential, and a list of citations should be presented at the end of the work (referencing of EMBO Journal articles is a good example). The reference list does not have to be included in your word count.

In the text a reference should be cited by author and date; e.g. 'Water is known to boil at 100°C (Jones and Brown, 1872; Brown *et al*, 1873) and freeze at…'. Not more than two authors may be cited per reference; if there are more than two authors use *et al*. References should be listed alphabetically according to the initial letter of the surname of the first author. Where the same authors have published more than one paper, list them in the order in which their papers appeared. If necessary use a and b, e.g. 1990a., with the authors' surnames and initials inverted.

References should include, in the following order:

authors' names; year; article or chapter title; editors (books only); journal or book title; name and address of publisher (books only); volume number and inclusive page numbers.

The name of each journal should be abbreviated according to the World List of Scientific Periodicals (see an EMBO J. paper for reference) and italicised. References should therefore be listed as follows:

Tugendreich, S., Bassett, D.E., Jr, McKusick,V.A., Boguski, M.S. and

Hieter, P. (1994) Genes conserved in yeast and humans. *Hum. Mol. Genet*., 3, 1509-1517.

Gehring, W. (1994) A history of the homeobox. In Duboule, D. (ed.), Guidebook to the Homeobox Genes. Oxford University Press, Oxford, UK, pp. 1-10.

Lewin, B. (1994) Genes V. Oxford University Press, Oxford, UK.

Structure: A good piece of writing will be clearly structured by division into appropriate sections, including an **introduction**, which provides a clear and concise statement of the issue to be discussed, and a **conclusion,** which briefly sums up the issues discussed.

Introduction: a clear and brief introduction of the topic of the work that describes the specific areas questions or issues that the reader should focus on.

Viewpoint: Students should form a view on the subject about which they are writing and should be able to support their views with balanced use of appropriate examples. A balanced piece of work will consider the relative strengths of the arguments for and against a particular point of view.

Conclusions: this section is used to pull the main themes of the work together and to briefly state the principal outcome of the analysis that you have performed. It should leave the reader with a clear impression of what you think about the subject matter presented.

Sentence construction, spelling, grammar: Students are expected to spell correctly and to follow the basic rules of grammar. Short, clear sentences are preferable to complex, tortuous, rambling constructions. You should be able to pick up the eight-clear grammatical, punctuation and spelling errors in the sentence that follows. If you can't, then revise your grammar/spelling rules. "It's clear to the company that there commercial targeted young people of the same age as Johns friends who were clearly able to receive its message."

Organisation: A written assignment is easier to read if it is attractively set out on the page (wide margins, double spaced, font size $\geq$12) with a logical progression and structure.

Specific comments: This section is provided for the staff to make comments that amplify the box assessments in the top half of the form.

Note that computer failure is not accepted as a reason for late submission - it is good practice to maintain at least two copies of computer files.

Sample Assessment/Feedback MyAberdeen Rubric

	Levels of Achievement				
Criteria	1st Class	2.1 Class	2.2 Class	3rd Class	Bare Pass
CONTENT	Excellent demonstration of knowledge and understanding, grasp of fundamental concepts, selective use of arguments.				Little or no relevant content, superficial knowledge, lack of grasp of fundamentals, arguments not relevant.
TECHNICAL INSIGHT	Clear recognition of how information was derived.				Lacking insight and a demonstration of how information was derived.
STRUCTURE	Clear logical structure with and meaningful introduction, main text and conclusion sections, clearly argued.				Poorly structured, confused order of topics, poorly focused.
FIGURES	Well integrated with text, with appropriate legend, clearly illustrated.				Not appropriate, poorly integrated, legends irrelevant or missing, untidy, poorly labelled.
REFERENCING	Good use of a range of references.				Citations lacking or erroneous, format inconsistent.
PRESENTATION	Visually attractive, well-organised, legible.				Untidy, badly organised, illegible.
SENTENCE CONSTRUCTION, SPELLING AND GRAMMAR	Sentence construction good, readability high, spelling and grammar correct.				Sentence construction poor, incoherent, many errors.

Class Representatives

We value students' opinions in regard to enhancing the quality of teaching and its delivery; therefore in conjunction with the Students' Association we support the Class Representative system.

In the School of Medicine, Medical Sciences & Nutrition we operate a system of course representatives, who are elected from within each course. Any student registered within a course that wishes to represent a given group of students can stand for election as a class representative. You will be informed when the elections for class representative will take place.

What will it involve?

It will involve speaking to your fellow students about the course you represent. This can include any comments that they may have. You will attend a Staff-Student Liaison Committee and you should represent the views and concerns of the students within this meeting. As a representative you will also be able to contribute to the agenda. You will then feedback to the students after this meeting with any actions that are being taken.

Training

Training for class representatives will be run by the Students Association. Training will take place within each half-session. For more information about the Class representative system visit **www.ausa.org.uk** or email the VP Education & Employability **vped@abdn.ac.uk**. Class representatives are also eligible to undertake the STAR (Students Taking Active Roles) Award with further information about this co-curricular award being available at: **www.abdn.ac.uk/careers**.

Problems with Coursework

If students have difficulties with any part of the course that they cannot cope with alone they should notify the course coordinator immediately. If the problem relates to the subject matter general advice would be to contact the member of staff who is teaching that part of the course. Students with registered disabilities should contact Mrs Jenna Reynolds (**medsci@abdn.ac.uk**) in the Medical Sciences Office (based in the Polwarth Building, Foresterhill), or Mrs Sheila Jones (**s.jones@abdn.ac.uk**) in the Old Aberdeen office associated with the teaching laboratories, to ensure that the appropriate facilities have been made available. Otherwise, you are strongly encouraged to contact any of the following as you see appropriate:

- Course student representatives
- Course co-ordinator
- Convenor of the Medical Sciences Staff/Student Liaison Committee (Prof Gordon McEwan)
- Personal Tutor
- Medical Sciences Disabilities Co-ordinator (Dr Derryck Shewan)

Most staff are based at Foresterhill and we strongly encourage the use of email or telephone the Medical Sciences Office. You may have a wasted journey travelling to Foresterhill only to find staff unavailable.

If a course has been completed and students are no longer on campus (i.e work from second semester during the summer vacation), coursework will be kept until the end of Freshers' Week, during the new academic year. After that point, unclaimed student work will be securely destroyed.

Course Reading List

This course does not have recommended textbooks as you are expected to read the primary research literature, so no specific course texts will be recommended. That said, your previous texts from third year would be useful for basic and fundamental knowledge.

Lecture Synopsis

Lectures are split across three main topics as shown below.

Tumor viruses and cancer (Dr Berndt Müller)

The identification of the role of viruses in cancer has led to the discovery of oncogenes, and an understanding of the molecular events involved in transformation of normal somatic cells into tumour cells. Here we will look at examples of how infections with the retrovirus HTLV-1 papilloma virus or the papilloma virus HPV leads to tumour formation by interacting with the cell cycle machinery and its control mechanisms.

The features of a cancer cell (Prof Valerie Speirs)

Topics covered will include the relationship between cancer and ageing, the steps required for cell transformation, an overview of the key hallmarks of cancer and how these might be exploited as therapeutic targets.

The cellular machinery that maintains genome integrity (Dr Shin-ichiro Hiraga)

Genetic information is encoded in chromosomal DNA, which is constantly exposed to molecules/chemicals that alter it, causing damage and/or mutations.

Eukaryotic cells have multiple mechanisms to maintain the integrity of their genomes against damage and mutations caused by internal and external sources. Here, we will review the cellular machinery that maintains genome integrity by ensuring the fidelity of chromosomal DNA replication, replication error-correction, and repair of DNA damage using examples from humans and model organisms.

We will look at how the failure of such safeguards mechanisms leads to the generation of cancers.

Stem cell biology and its applications (Dr Anke Roelofs)

These lectures will provide an introduction to stem cells, focussing on key concepts in stem cell biology such as self-renewal and potency. Examples of transgenic models that allow for *in vivo* tracing of stem cells and their progeny will be used to illustrate how these have shaped our understanding of adult stem cells. Focus will also be on telomeres and their role in stem cell maintenance, and emerging concepts of cancer stem cells will be highlighted. Finally, cellular reprogramming technologies that allow for the generation of induced pluripotent stem cells from somatic cells will be discussed.

Practical/Lab/Tutorial Work

This course contains one set of research tutorial sessions and you will also complete another set of corresponding research tutorial exercises in your other Option course.

The research tutorials are teaching exercises at which, supported by a staff member, you will discuss a specialist subject, based upon self-directed reading of the literature. Several papers have been chosen that reflect the development of a particular topic, **and you must have read papers before attending the first research tutorial**. You will be required to develop an understanding of what constitutes a key and important paper, how the information is derived (techniques and their application), the design of those experiments, an understanding of the crucial data and an appreciation of what in the field is controversial. You are also expected to read outside the prescribed papers and such 'use of extensive original literature' (CGS marking scheme) will be taken as an indicator of a first class student. You will thus build up a set of your own notes on the particular subject area within the research tutorial.

You will be expected to attend two tutorials, each of 1-2 hours, during which some group work may be required.

Preparation:

The time spent with the tutors for each tutorial is very limited (3-4 hours). For this reason, it is important to 'hit the ground running' and go into the first of your two 2-hour sessions fully prepared. It is thus essential that you read the appropriate notes page(s) which follow, and prepare by reading any supporting review recommended by the tutors, as well as the papers listed. This reading of the papers should be thorough, making sure in particular you understand the rationale of the results sections, how all the techniques work that are described and how the results lead to the main conclusions of the paper. If anything is not clear, bring those questions along to the tutorial with you; if you are critical of anything in the papers, bring these discussion points along as well. Remember, the tutors are there to support your learning, not to spoon-feed you with the answers. You should therefore go to the tutorial prepared to ask questions, to think, and to contribute to the group discussion subjects suggested in the tutorial notes (below).

BIOCHEMISTRY RESEARCH TUTORIAL 2
HOW DOES DERAILMENT OF GENOME STABILITY PATHWAYS CAUSE CANCER?
Tutor: Prof Anne Donaldson (a.d.donaldson@abdn.ac.uk)

Introduction

Studying inherited mutations in the BRCA1 and BRCA2 proteins has shaped our understanding of the pathological mechanisms that lead to cancer. In this tutorial we will explore the implications of two recent studies addressing how the BRCA proteins ensure genome stability to prevent cancer. The long-held view has been that BRCA proteins specify the mechanism

of double-strand repair, directing repair to occur through accurate homology-directed mechanisms. Newer studies highlight a more recently uncovered role for the BRCA proteins, in protecting the nascent DNA at blocked replication forks. We examine the evidence presented in two of these papers and consider what they can teach us about how cancer starts.

You can access the PubMed entry for that paper by clicking on the title of each paper listed below.

Papers to be discussed in the tutorial are:

'Double-strand break repair-independent role for BRCA2 in blocking stalled replication fork degradation by MRE11'
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3261725/

'Isomerization of BRCA1–BARD1 promotes replication fork protection'
https://doi.org/10.1038/s41586-019-1363-4

University Policies

Students are asked to make themselves familiar with the information on key institutional policies which been made available within MyAberdeen (**https://abdn.blackboard.com/bbcswebdav/institution/Policies**). These policies are relevant to all students and will be useful to you throughout your studies. They contain important information and address issues such as what to do if you are absent, how to raise an appeal or a complaint and indicate how seriously the University takes your feedback.

These institutional policies should be read in conjunction with this programme and/or course handbook, in which School and College specific policies are detailed. Further information can be found on the **University[1]s Infohub webpage** or by visiting the Infohub.

The information included in the institutional area for 2019/20 includes the following:

- Absence
- Appeals & Complaints
- Student Discipline
- Class Certificates
- MyAberdeen
- Originality Checking
- Feedback
- Communication
- Graduate Attributes
- The Co-Curriculum

Medical Sciences Common Grading Scale

Grade	Grade Point	Category	Honours Class	Description
A1	22	Excellent	First	• Outstanding ability and critical thought • Evidence of extensive reading • Superior understanding • The best performance that can be expected from a student at this level
A2	21			
A3	20			
A4	19			
A5	18			
B1	17	Very Good	Upper Second	• Able to argue logically and organise answers well • Shows a thorough grasp of concepts • Good use of examples to illustrate points and justify arguments • Evidence of reading and wide appreciation of subject
B2	16			
B3	15			
C1	14	Good	Lower Second	• Repetition of lecture notes without evidence of further appreciation of subject • Lacking illustrative examples and originality • Basic level of understanding
C2	13			
C3	12			
D1	11	Pass	Third	• Limited ability to argue logically and organise answers • Failure to develop or illustrate points • The minimum level of performance required for a student to be awarded a pass
D2	10			
D3	9			
E1	8	Fail	Fail	• Weak presentation • Tendency to irrelevance • Some attempt at an answer but seriously lacking in content and/or ability to organise thoughts
E2	7			
E3	6			
F1	5	Clear Fail	Not used for Honours	• Contains major errors or misconceptions • Poor presentation
F2	4			
F3	3			
G1	2	Clear Fail/ Abysmal	-	• Token or no submission
G2	1			
G3	0			

Course Timetable BC4314: 2019-2020

Date	Time	Place	Subject	Session	Staff
Week 13					
Mon 21 Oct					
Tue 22 Oct	13:00-14:00	BMP LT	Tumor viruses and cancer (1)	Lecture	Dr B Müller
	14:00-15:00	BMP LT	Tumor viruses and cancer (2)	Lecture	Dr B Müller
Wed 23 Oct					
Thu 24 Oct					
Fri 25 Oct					
Week 14					
Mon 28 Oct	15:00-16:00	BMP LT	Biochemistry 2 Research Tutorial part 1	Tutorial	Prof A Donaldson
	16:00-17:00	BMP LT	Biochemistry 2 Research Tutorial part 1	Tutorial	Prof A Donaldson
Tue 29 Oct	13:00-14:00	1:143/144	The features of a cancer cell (1)	Lecture	Prof V Speirs
	14:00-15:00	1:143/144	The features of a cancer cell (2)	Lecture	Prof V Speirs
Wed 30 Oct					
Thu 31 Oct					
Fri 1 Nov					
Week 15					
Mon 4 Nov	15:00-1600	BMP LT	The cellular machinery that maintains genome integrity (1)	Lecture	Dr S Hiraga
	16:00-17:00	BMP LT	The cellular machinery that maintains genome integrity (2)	Lecture	Dr S Hiraga
Tue 5 Nov	13:00-14:00	BMP LT	The features of a cancer cell (3)	Lecture	Prof V Speirs
	14:00-15:00	BMP LT	The features of a cancer cell (4)	Lecture	Prof V Speirs
Wed 6 Nov					
Thu 7 Nov					
Fri 8 Nov					
Week 16					
Mon 11 Nov	12:00-13:00	Med Chi Hall	Biochemistry 2 Research Tutorial part 2	Tutorial	Prof A Donaldson
	13:00-14:00	Med Chi Hall	Biochemistry 2 Research Tutorial part 2	Tutorial	Prof A Donaldson
Mon 11 Nov	15:00-16:00	1:143/144	Stem cell biology and its applications (1)	Lecture	Dr A Roelofs
	16:00-17:00	1:143/144	Stem cell biology and its applications (2)	Lecture	Dr A Roelofs
Tue 12 Nov	13:00-14:00	BMP LT	Stem cell biology and its applications (3)	Lecture	Dr A Roelofs
	14:00-15:00	BMP LT	Stem cell biology and its applications (4)	Lecture	Dr A Roelofs
Wed 13 Nov					
Thu 14 Nov					
Fri 15 Nov					

1:143/144, Polwarth Building; BMP LT, Biomedical Physics Lecture Theatre, Medical Physics Building; Med Chi Hall, Polwarth Building.