School Of Medicine, Medical Sciences & Nutrition

IM4006

Current Research in Immunology

Course Handbook
2019-20

1495 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

The aim of this course is to provide an in-depth understanding of selected aspects of Immunology. In the first five weeks the focus will be on **Infection, Immunity and Disease**, and in the second five weeks it will be on **Molecular Immunology**.

In **Infection, Immunity and Disease** you will study immune function in the context of disease to understand how immunological dysfunction can lead to a pathological inflammatory response and disease. We will examine how tolerance to non-infectious or self-antigen is broken and the role of T lymphocyte subset differentiation and bias in autoimmunity and asthma. In addition, we will also consider how pathogens subvert the immune response to avoid immune detection and establish chronic infections.

The second strand (**Molecular Immunology)** will provide an in-depth understanding of how the immune system acts to protect us at a molecular level, and how in the future we could manipulate it to generate novel immunotherapies. Main learning outcomes include understanding the molecular mechanisms that allow the immune system to respond to the many challenges it faces. These include drawing out functional insights from recent studies that identify novel signalling pathways and molecular interactions affecting disease susceptibility and resistance. It also covers recent progress on how early interactions with infection through the innate immune system can shape and tailor immune responses, for example, by altering macrophage and dendritic cell activities to provide crucial information to the adaptive immune response.

The final part of the course includes a set of workshops which will discuss the latest technologies used in immunological research. Initial lectures are also provided on generic skills such as essay writing which will help with assignments.

Course Aims & Learning Outcomes

The **subject-specific learning outcomes** are such that, at the end of the course you will be able to;

- describe the complex cellular and molecular processes underlying the co-ordinated series of events linking the innate and adaptive immune response to infection
- understand the differentiation and roles of different T cell subsets in disease
- describe different types of immunodeficiency
- understand how tolerance to non-infectious or self-antigens can be broken to induce autoimmunity or allergy, and why failure of normal immune regulatory mechanisms can cause chronic inflammation

- gain an appreciation of how pathogens evade detection and elimination by the immune system and cause disease
- describe the human adaptive immune response and the role that inheritance genes of the immune system play in disease susceptibility; how immunological homeostasis is maintained by regulatory cells, and how immunological dysfunction can lead to disease.
- understand how specialized antigen receptors of T and B lymphocytes function to induce immunity, tolerance or disease.
- understand and describe the interaction of cells cytokines, chemokines and other immune mediators that regulate leucocyte trafficking and migration during inflammation
- describe the role of phage display technologies in elucidating immuno-genetic repertoires and understand the contribution of MHC structure to its function in T cell recognition

Course Teaching Staff

Course Co-ordinator(s):

Dr Isabel Crane (**i.j.crane@abdn.ac.uk**)
Prof Heather Wilson **(h.m.wilson@abdn.ac.uk)**
Dr Frank Ward **(f.j.ward@abdn.ac.uk)**

Other Staff:

Dr Rasha Abu-Eid (**rasha.abueid@abdn.ac.uk**)
Dr Marwan Albuhtori (**marwan.albuhtori@abdn.ac.uk**)
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Dr Heather Wilson (**h.m.wilson@abdn.ac.uk**
Mr Kevin Mackenzie (**k.s.mackenzie@abdn.ac.uk**)
Dr Patrick Cao (h.cao@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 two pieces of continuous assessment (worth 30% of the overall course grade).

The continuous assessment associated with this course is a Research Perspective and a Research Essay as detailed below.

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 are:

- *Research Perspective*: 12 NOON, Monday 30th September.
- *Research Essay*: 12 NOON, Monday 2nd December.

Research Perspective

This piece of work is intended to provide a quick update to the reader on one research article from the field of immunology. The work should give additional insight on the topic, highlighting broader implications for the field that have not already been provided by the original paper.

You are writing for a wide but scientifically trained audience, not only for readers in your own field. You can assume that your audience is competent in the basic language of the subject but may require explanation or definition of technical terms, concepts, and assumptions specific to your topic. Avoid jargon, but do not oversimplify or cut corners: be accurate and precise throughout.

As a guide and good example of this kind of article, see the Nature *News and Views* articles at the following links.

www.nature.com/nature/articles?type=news-and-views

https://www.nature.com/articles/nature23090.pdf

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

- *Title* (8 words maximum)
- *Chosen Article* – A reference of your chosen research paper written in a standard reference format (as below)
- *Keywords* (at least 2 and a maximum of 6)

- *Abstract* (50 words maximum) – Please provide a short teaser to set the scene and introduce the main take home-message of the article. Must not include reference citations
- *Name*
- *Student ID*
- *Word Count*

Word count for your Research Perspective is **1,000 words** and you can use a maximum of two figures/tables. The word limit does not include text in tables, figure legends, abstract, or references.

The research article to be used is

Kooy-Winkelaar, Yvonne M. C.; Bouwer, Dagmar; Janssen, George M. C.; et al (2017) 'CD4 T-cell cytokines synergize to induce proliferation of malignant and nonmalignant innate intraepithelial lymphocytes.', *Proceedings of the National Academy of Sciences of the United States of America*. National Academy of Sciences, 114(6), pp. E980-E989 doi: 10.1073/pnas.1620036114.

Research Essay

The essay topics are given below. You should select one title from the list.

1. Immune checkpoints such as CTLA-4 and PD-1 as immunotherapy targets for cancer.
2. Discuss molecular mechanisms that enable natural killer cells to distinguish tumours, virally infected or stressed cells from normal cells.

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 in a standardised manner. An example assessment form is shown below. You will 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: A section is provided for the staff to make comments that amplify the box assessments.

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), 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)
- Adviser of studies
- Disabilities Co-ordinator (Dr Derryck Shewan)

All staff are based at Foresterhill and we strongly encourage the use of email or telephone the School 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 in particular Abbas, Lichtman and Pillai, Cellular and Molecular Immunology.

Lecture Synopsis

The course starts with some generic skills lectures designed to help with assignments

Infection, Immunity and Disease

In this set of lectures students will study immune function in the context of disease to understand how immunological dysfunction can lead to a pathological inflammatory response and disease. We will examine how tolerance to non-infectious or self-antigen is broken and the role of T lymphocyte subset differentiation and bias in autoimmunity and asthma. In addition, we will also consider how pathogens subvert the immune response to avoid immune detection and establish chronic infections.

We will look in detail at the complex cellular and molecular immune mechanisms underlying the recognition of and responses toward microorganisms and cancer and the co-ordinated series of events linking the innate with the adaptive immune response to infection. We will also examine immune responses to specific bacterial, fungal and parasitic agents that cause cancer, candidiasis, or parasitic diseases.

Key to adaptive immune responses and immunological tolerance is the dendritic cell, which is pivotal both in driving and suppressing aggressive immune responses. We will first study the important mechanisms of antigen processing and presentation by dendritic cells to T cells. The role of immunological tolerance will be examined especially in the context of autoimmune disease where therapies that selectively switch off damaging anti-self immune responses are urgently required. Also relevant to a number of autoimmune diseases, including rheumatoid arthritis and psoriasis, is the recently defined T cell subset, the Th17 cell which will be discussed.

Allergies are usually driven by immediate hypersensitivity responses to common environmental proteins and chemicals rather than infection. Immunoglobulin-E, mast cells, eosinophils and basophils are central to the pathology. The mechanisms governing cell recruitment and the effects of mediators produced in allergy will be described. Asthma will be used to illustrate how a chronic inflammatory disorder can develop. This will include the signals controlling the accumulation of cells such as eosinophils, the contribution of the bronchial epithelium and other structural lung tissues to asthma pathogenesis and the significance of apoptosis in the resolution. How disease is initiated and ultimately controlled by underlying Th1/Th2 cell activity and the potential for allergen de-sensitisation will be described. Finally, we will study the remarkable diversity of passive and active immune evasion strategies utilised by cancer cells and pathogens to cause chronic infections and explore potential therapeutic and vaccination strategies for these.

Molecular Immunology

The aim of the molecular immunology strand is to focus on recent discoveries that have shaped our understanding of how the adaptive immune system (mainly comprised of B and T lymphocytes) discriminates and functions at a molecular level.

T-cells are of fundamental importance to the adaptive immune system and require interaction with polymorphic major histocompatibility molecules (MHC). The genomic organisation and molecular composition of MHC, and their significance in autoimmune disease, will be explored. T-cell mediated immunological tolerance is of great interest because it could be harnessed for therapies to suppress damaging inflammatory responses in immune-mediated disorders. We will review immunological tolerance and elaborate proposed models to explain how the immune system discriminates harmful from non-harmful challenges. $CD4^+$ regulatory T-cells contribute to immunological tolerance, and their function and potential as therapeutic agents will be explored. Understanding immune evasion strategies at a molecular level is of prime importance especially in tumour immunology where there are clear links between tumour formation and persistence of particular microbial pathogens.

A second theme summarises the decision-making processes that permit T-cells to generate an appropriate response after antigen encounter. Naïve and memory T-cell activation, effector cell differentiation, and the molecular signalling mechanisms behind them are reviewed.

Several new lectures have also been introduced to cover a number of exciting areas of immunology: Aire is a gene that contributes to self-non-self-discrimination in thymic selection, but recent work has uncovered some unexpected roles for this molecule. Activation and inhibitory receptors act to balance immune response intensity – too weak or strong a response against a pathogen can be equally damaging.

Finally, up to 20% of emerging clinical pharmaceutical therapies are based on engineered monoclonal antibodies. The final theme in this course is to evaluate the strategies that have been successfully employed in antibody-based technology from elucidating antibody structure through to designing antibodies and antibody fragments that form a basis for new therapies.

Material for the course will be drawn from a wide range of sources and in particular, cutting edge publications will be covered in lectures.

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 IM4006: 2019-2020

Date	Time	Venue	Subject	Session	Staff
Week 7					
			GENERIC SKILLS		
Mon 9 Sep	11:00-12:00	LT	Essay Writing	Lecture	Dr J Barrow
	14:00-14:30	LT	Honours Project Information	Lecture	Dr D Shewan
	14.30-15.00	LT	Free time		
	15.00-16.00	LT	Careers	Lecture	
	16:00-17:00	LT	Immunology Pharmacology Introduction	Lecture	Dr I Crane
Tue 10 Sep	10.00-12.00	LT	Searching databases Ovid and internet resources	Lecture	Library
Wed 11 Sep					
Thu 12 Sep					
Fri 13 Sep	13.00-14.00	Aud	Citing, Referencing and Plagiarism	Lecture	Dr D Scott
Week 8					
			INFECTION, IMMUNITY AND DISEASE (IMMUNOLOGY 2) PATHOGEN RECOGNITION AND DOWNSTREAM EVENTS		
Mon 6 Sep	16:00-17:00	1:154	Introduction to the course	Lecture	Prof H Wilson
	17:00-18:00	1:154	Pattern recognition and "danger signals"	Lecture	Prof H Wilson
Tue 17 Sep	10:00-11:00	1:154	Antigen processing and presentation	Lecture	Dr F Ward
	11:00-12:00	1:154	T_H subset activation and functions	Lecture	Dr F Ward
Wed 18 Sep					
Thu 19 Sep					
Fri 20 Sep					
Week 9					
			TOLERANCE AND AUTOIMMUNITY		
Mon 23 Sep	16:00-17:00	1:154	Mechanisms of Tolerance	Lecture	Dr F Ward
	17:00-18:00	1:154	Mechanisms of autoimmunity/autoimmune disease	Lecture	Dr F Ward
Tue 24 Sep	15:00-16:00	1M:003	Tolerance: Foetal Maternal Interaction	Lecture	Dr F Ward
Wed 25 Sep					
Thu 26 Sep					
Fri 27 Sep					
Week 10					
			IMMUNE EVASION		
Mon 30 Sep	14:00-15:00	1M:003	Molecular mechanisms of immune evasion	Lecture	Dr J Holland
	15:00-16:00	1M:003	Immune evasion: parasites	Lecture	Dr J Holland
Tue 1 Oct	11:00-12:00	1M:001	Immune evasion: Sepsis	Lecture	Prof H Galley
	13:00-14:00	1M:003	Immune evasion: *Candida albicans*	Lecture	Dr D MacCallum
	14:00-15:00	1M:003	Immune evasion: Viruses	Lecture	Dr M AlBuhtori
Wed 2 Oct					
Thu 3 Oct					
Fri 4 Oct					

Week 11					
Mon 7 Oct	15:00-16:00	Aud	Immune evasion: Cancer	Lecture	Dr R Abu-Eid
			ATOPIC DISEASE		
Tue 8 Oct	10:00-12:00	1:032/033	Asthma: immune response and therapy	Lecture	Dr I Crane
	13:00-14:00	1:154	Other atopic diseases	Lecture	Dr I Crane
Wed 9 Oct					
Thu 10 Oct					
Fri 11 Oct	13:00-14:00	LT	Statistics	Lecture	Dr D Scott
Week 12					
Mon 14 Oct					
Tue 15 Oct					
Wed 16 Oct					
Thu 17 Oct					
Fri 18 Oct					
Week 13					
			MOLECULAR IMMUNOLOGY **(IMMUNOLOGY 2)** **CONTROLLING THE ADAPTIVE IMMUNE RESPONSE**		
Mon 21 Oct	14:00-15:00	BMP LT	Introduction to the course; structure, assessment etc MHC molecules and transplantation	Lecture	Dr F Ward
	15:00-16:00	BMP LT	Immunomodulation with Rapamycin	Lecture	Dr F Ward
Tue 22 Oct	11:00-12:00	1:143/144	Ultimate control freaks - Regulatory T Cells	Lecture	Dr F Ward
	12:00-13:00	1:143/144	T Cell Polarisation - tailored immunity for a broad range of pathogens	Lecture	Dr F Ward
Wed 23 Oct					
Thu 24 Oct					
Fri 25 Oct					
Week 14					
Mon 28 Oct	14:00-15:00	1:143/144	T cell polarisation and its control by cytokine signalling	Lecture	Prof H Wilson
	15:00-16:00	1:147	Cytokines and cytokine receptors - targets for treatment of disease	Lecture	Prof H Wilson
Tue 29 Oct	13:00-14:00	1:147	Tfh cells and their role	Lecture	Dr S Sabir
	14:00-15:00	1:147	Fast track evolution in B cells? The role of activation induced cytidine deaminase (AID) in antibody function	Lecture	Dr F Ward
Wed 30 Oct					
Thu 31 Oct					
Fri 1 Nov					
Week 15					
Mon 4 Nov	14:00-15:00	1:147	Aire: the identity of "Self"	Lecture	Dr F Ward
Tue 5 Nov					
Wed 6 Nov	09:00-10:00	1:143/144	Regulating movement of naïve T and B cells	Lecture	Dr I Crane
	10:00-11:00	1:143/144	Regulating recruitment of effector T cells	Lecture	Dr I Crane
Thu 7 Nov					
Fri 8 Nov					

Week 16					
Mon 11 Nov			**REGULATING THE INNATE IMMUNE RESPONSE**		
	13:00-14:00	1:147	Macrophage activation and polarisation - implications for disease	Lecture	Dr H Wilson
	14:00-15:00	1:147	tbc	Tutorial	Dr F Ward
Tue 12 Nov	13:00-14:00	1:147	Inflammasomes and autoinflammation	Lecture	Dr P Cao
Wed 13 Nov					
Thu 14 Nov					
Fri 15 Nov	10:00-12:00	1:039/040	Combining flow cytometry and image analysis in immunology research	Workshop	Dr R Abu Eid
Week 17					
Mon 18 Nov	15:00-16:00	1.154	The Emerging role of Fc receptors in protective immunity	Lecture	Dr F Ward
	16.00-17.00	1.154	Novel vaccine development	Lecture	Dr F Ward
Tue 19 Nov	14:00-16:00	1:154	Immunological research using in vivo models	Workshop	Dr M Albuhtori
Wed 20 Nov					
Thu 21 Nov	14:00-16:00	1:154	Glycomics in immunological research	Workshop	Dr P Cao
Fri 22 Nov	10:00-12:00	1:039/040	High resolution microscopy in immunological research	Workshop	Mr K Mackenzie