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*Undergraduate Medical Sciences*

*School of Medicine, Medical Sciences & Nutrition*

*MC4014- Honours Microbiology Option 1*

*Course Handbook 2023-2024*

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Course Summary

This course will consider the nature of speciation in microorganisms and how using microbial 16S rRNA gene sequences can be used to identify bacterial taxa. In higher organisms, species definitions are based upon easily observable differences, visible characteristics and behaviours. In microorganisms, there are frequently no visible differences between closely-related species, and researchers have relied either upon biochemical differences in bacterial metabolism, or more recently, DNA sequences to differentiate between species. However, related strains of the same species can exhibit profound differences in genome structure and composition. The molecular mechanisms that drive speciation and the ability of bacteria to survive in the human gut in addition to the acquisition of antibiotic resistance traits will be considered. Students will also consider faecal microbiota transplant (FMT) and the impact of probiotics and prebiotics in modulating the gut microbiota to improve health.

A bioinformatics workshop will provide initial training on the analysis of human gut microbiota using 16S rRNA gene sequence-based data. A separate research tutorial exercise will be in the format of a quiz that will focus on general gut microbiology. Finally, students will be guided on how to critically assess published scientific literature, and the importance of communicating complex science to non-expert audiences. The students will be provided with several research paper references for each topic and use these papers to prepare a short essay.

Course Aims & Learning Outcomes

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

* Understand the concept of speciation in microorganisms and the molecular methods used to define a bacterial species and profile the composition of human gut samples.
* Understand the factors that modulate the composition of the human gut microbes including gut environmental factors.
* Understand the evolution and spread of antibiotic resistance mechanisms in bacteria
* Understand the different molecular mechanisms of gene regulation in bacteria

Course Teaching Staff

Course Coordinators:

Dr Petra Louis ([p.louis@abdn.ac.uk)](mailto:p.louis@abdn.ac.uk))

Dr Alan Walker ([alan.walker@abdn.ac.uk](mailto:alan.walker@abdn.ac.uk))

Other Staff:

Dr Delma Childers (**delma.childers@abdn.ac.uk**)

Dr Sylvia Duncan ([sylvia.duncan@abdn.ac.uk](mailto:sylvia.duncan@abdn.ac.uk))

Dr Indrani Mukhopadhya ([indrani.mukhopadhya@abdn.ac.uk](mailto:indrani.mukhopadhya@abdn.ac.uk))

Prof Karen Scott ([k.scott@abdn.ac.uk](mailto:k.scott@abdn.ac.uk))

Learning Approach

* All lectures will be face-to-face and may also include additional reading material, which aims to complement the lecture material in more depth. At level 4 independent learning and critical thinking is important.
* Lectures will be supported by tutorials. **For most of these tutorial sessions there is some work to prepare beforehand, so check what is required well in advance** (information is provided in this handbook, and will also be communicated to you via MyAberdeen) and bring it with you. These tutorials are compulsory, and attendance will be monitored so that we can help if you are falling behind for any reason. Lack of attendance on these without a valid reason will trigger a C6.
* A Q&A session will be held towards the end of the course. You can also ask questions of the lecturers via email but please try to email between 9.30 and 12 noon each Monday and we will do our best to respond within three working days.

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.

**Deadline for Option 1 course *Research Tutorial Spotlight*: 12 NOON, Monday 6th November**

Research Tutorial Spotlight

This exercise aims to create a lay summary of a topic suggested in the research tutorials contained within this course (see also Pages 15 to 17 below for more information). The objective here is to read a formal published scientific article, and then write a brief summary of that study that is targeted towards a lay audience (i.e., members of the public), rather than researchers or scientific professionals. As a term of reference, please read the following article written for National Geographic:

[**https://www.nationalgeographic.com/science/phenomena/2014/11/11/contaminomics-why-some-microbiome-studies-may-be-wrong/**](https://www.nationalgeographic.com/science/phenomena/2014/11/11/contaminomics-why-some-microbiome-studies-may-be-wrong/)

and then read the original research article it is based upon:

[**https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-014-0087-z**](https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-014-0087-z)

You can see there is clear difference in the tone and content of the two articles. Lay summaries should be written in plain English, avoid the use of jargon and explain any technical terms that have to be included. Overall, this piece of work should have a more journalistic style and be engaging. However, being neutral and accurate is also very important. You don’t have to “spin” concepts, or be controversial, to make it understandable and engaging for a general lay audience.

For this exercise, you will write a lay summary for ONE of the following four articles (choose whichever one you would most like to write about):

1. Maldonado-Gómez *et al*. Stable Engraftment of *Bifidobacterium longum* AH1206 in the Human Gut Depends on Individualized Features of the Resident Microbiome. (2016). *Cell Host & Microbe* 20, 515-526; <https://www.sciencedirect.com/science/article/pii/S193131281630378X>
2. Morono *et al*. Aerobic microbial life persists in oxic marine sediment as old as 101.5 million years. (2020). Nature Communications 11, 3626;

<https://www.nature.com/articles/s41467-020-17330-1>

1. Pierre *et al* *Peptide YY: A Paneth cell antimicrobial peptide that maintains Candida gut commensalism*. (2023). Science 4;381(6657):502-508.

<https://doi.org/10.1126/science.abq3178>

1. Stone et al. Dynamic ploidy changes drive fluconazole resistance in human cryptococcal meningitis. (2019). Journal of Clinical Investigation 129(3); 999-1014

<https://doi.org/10.1172/JCI124516>

Your submission should be short, should use a simple figure to summarise the work (as a visual aid for the reader), and have a concise list (3-5 articles) of relevant references. As guidance, you should take the reader through the following:

The background: what did we know before; why were the studies conducted? In particular, place the subject matter in a broader context for a lay reader – explain why they should pay attention to the topic – what is important and why?

The subject/topic itself: what did the researchers do and find; some strengths and limitations; what are the wider implications?

The future: what are the next steps; are there unanswered questions?

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

* *Title* (8 words maximum)
* *Name*
* *Student ID*
* *Word Count*

The word count limit for your Research Spotlight is 800 words and you can use a maximum of one figure. The word limit does not include text in the figure or references.

As an excellent resource and some guidance on writing for a lay audience, see the link below to the “Make it Clear” campaign, aimed at making scientific writing and research as clear and understandable as possible.

[**http://www.invo.org.uk/makeitclear/**](http://www.invo.org.uk/makeitclear/)

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# 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 criterion 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 used 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?

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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.

Organisation: A written assignment is easier to read if it is attractively set out on the page (wide margins, double spaced, font size ³12) 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 Form

# Table Description automatically generated

# 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](http://www.ausa.org.uk) or email the VP Education & Employability [vped@abdn.ac.uk](mailto: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](http://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 in general, advice would be to contact the member of staff who is teaching that part of the course. Students with registered disabilities should contact the medical sciences office, ([medsci@abdn.ac.uk](mailto:medsci@abdn.ac.uk)) (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 (Professor Gordon McEwan)
* Personal Tutor
* Medical Sciences Disabilities Co-ordinator (Dr Derryck Shewan)

All 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 half session during the summer vacation), coursework will be kept until the end of Fresher’s 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

# *Human gut microbiology; what defines its composition*

Dr Alan Walker

Molecular tools to profile microbial communities

This lecture will describe some of the modern, primarily DNA sequencing-based, techniques being used to study microbial communities. It will cover some of the inherent advantages and limitations of these techniques and demonstrate how methodological artefacts such as contamination can distort results obtained.

Dr Indrani Mukhopadhya

Human gut virome

The gut virome comprises of eukaryotic and prokaryotic viruses that occupy a special niche in the gut lumen and play a distinctive role in human health. This lecture will review the current understanding of the overall constitution of the human gut virome, its evolution over time, its life-long association with the host that determines development of specific gastrointestinal diseases, e.g. Inflammatory bowel disease and the role of environmental factors like diet. The recent advances of metagenomic assessment and viral databases will be highlighted as key factors that have enhanced our understanding of the gut virome. There will be an emphasis on the trans-kingdom microbiome interactions between viruses and bacteria that can influence host health and disease and potential therapeutic interventions against an altered gut virome.

Dr Alan Walker and Dr Indrani Mukhopadhya

Bioinformatics workshop; Use various online software packages to demonstrate how to analyse and profile human gut microbiota samples using 16S rRNA gene sequences.

The first lecture of the course “Molecular tools to profile microbial communities” by Dr Alan Walker (as described above) gives valuable background information that will aid your understanding during the workshop. So, please do attend the lecture so that you are well prepared for the workshop.

In the Course Materials section on MyAberdeen you will find a handout Word document that you will follow during the workshop, as well as input files for running the software. Please download the zipped folder containing the input files and extract the individual files in advance of the workshop.

During the workshop you will be using the following web-based pieces of software:

NCBI BLAST:

[**https://blast.ncbi.nlm.nih.gov/Blast.cgi**](https://blast.ncbi.nlm.nih.gov/Blast.cgi)

Ribosomal Database Project (RDP) Classifier:

[**https://rdp.cme.msu.edu/classifier/classifier.jsp**](https://rdp.cme.msu.edu/classifier/classifier.jsp)

Microbiome Analyst:

[**https://www.microbiomeanalyst.ca/faces/home.xhtml**](https://www.microbiomeanalyst.ca/faces/home.xhtml)

iTOL:

[**https://itol.embl.de/**](https://itol.embl.de/)

*The development and changes in the composition and gene regulation of the gut microbiota:*

Dr Sylvia Duncan

Human gut microbiology

These lectures will cover the impact of gut environmental factors that modulate the composition of the human gut microbiota. The distinct factors, including anaerobiosis, pH, bile salts and diet which are factors that modulate the composition of the gut microbiota and its activities will be described.

Dr Karen Scott

Mechanisms of spread of antibiotic resistance

The main methods contributing to the spread of antibiotic resistance genes between bacteria will be explained,

and the importance of the principles of One Health in limiting the rise in global antibiotic resistance discussed.

Dr Petra Louis

Gene regulation

The different mechanisms underlying the regulation of gene expression in bacteria will be covered. Examples

of different strategies in gene regulation of human gut bacteria 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 in this course are split into two distinct parts (A and B), and are small group teaching exercises, supported by a staff member. You will be guided on how to critically assess a specialist subject, based upon self-directed reading of the literature (Part A), and then how to communicate take home messages in simple language that can be understood by a general lay audience (Part B).

***Preparation:***

The time spent with the tutors for each tutorial is very limited (1-2 hours). For this reason, it is important to 'hit the ground running' and go into your two tutorial sessions fully prepared. It is thus essential that you read the appropriate notes pages 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.

You should endeavour to participate actively in the Tutorial discussions in what will be a relaxed and informal learning environment where “stupid” questions are welcome and encouraged. 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).

The tutorials are spaced so as to allow time to prepare for each of the two synchronous sessions, each of which will have a different focus and address a different set of questions.

**MICROBIOLOGY RESEARCH TUTORIAL (PART A):**

**Critically assessing scientific literature**

**Tutor: Dr Delma Childers (**[delma.childers@abdn.ac.uk](mailto:delma.childers@abdn.ac.uk)**)**

One key objective of this tutorial series is for you to understand the concept of “hypothesis driven research”, how to critically evaluate it, and the importance of understanding how to communicate about research with different audiences. In the first tutorial we will address the concept of hypothesis-driven research through critical evaluation of the papers below.

**You must read the four papers listed below before attending research tutorial A**.

Papers 1 and 2 are reviews that provide a helpful introduction to the area of antimicrobial resistance and current outside-the-box approaches to address this problem. Papers 3 and 4 are primary research articles that we will critically discuss.

1. Schikora-Tamarit MA & Gabaldon T. Using genomics to understand the mechanisms of virulence and drug resistance in fungal pathogens. Biochem Soc Trans. 2022;50(3):1259-1268. doi: 10.1042/BST20211123
2. Fisher et al. Tackling the emerging threat of antifungal resistance to human health. Nature Reviews Microbiology 2022. HYPERLINK "https://www.frontiersin.org/article/10.3389/fmicb.2019.00539" doi: 10.1038/s41579-022-00720-1
3. Harrison et al. A Tetraploid Intermediate Precedes Aneuploid Formation in Yeasts Exposed to Fluconazole. PLOS Biology. 2014; 12(3): e1001815; doi: https://doi.org/ 10.1371/journal.pbio.1001815
4. Garcia-Rubio R et al. Critical Assessment of Cell Wall Integrity Factors Contributing to in vivo Echinocandin Tolerance and Resistance in Candida glabrata. Front. Microbiol. 2021; doi: 10.3389/fmicb.2021.702779

**Please come to the first tutorial having done the following:**

* Carefully read the reviews by Schikora-Tamarit and Fisher *et al.* (papers 1 and 2).
* Critically read, and make notes on, papers 3 and 4 (Harrison *et al.* and Garcia-Rubio *et al*.). Be prepared to discuss both papers in detail at the tutorial. You will be expected to have a firm grasp of the content of these papers. For the experiments, you should consider and take notes on each of the following points:

1. What is the hypothesis being tested?
2. What is the rationale for doing each experiment?
3. How was each experiment done; what methods were used and how do they work?
4. What are the advantages (or any disadvantages) of using the chosen method?
5. What were the observations made?
6. How do the authors interpret these observations? (there may be more than one!)
7. Do the data support the conclusion(s) reached?
8. Are there any alternative interpretations of the data?
9. What alternative experimental approaches could have been used? – This is your chance to design an alternative experiment which tests the hypothesis in a different way – without financial restrictions and access to any assets you might require.

Be prepared to discuss the answers to these questions with your peers and tutors during the first synchronous session.

**MICROBIOLOGY RESEARCH TUTORIAL (PART B):**

**Communicating complex science to non-experts**

**Tutors: Dr Alan Walker (**[alan.walker@abdn.ac.uk](mailto:alan.walker@abdn.ac.uk)**) and Dr Delma Childers (**[delma.childers@abdn.ac.uk](mailto:delma.childers@abdn.ac.uk)**)**

We live in an age when it has never been easier for misinformation to be spread quickly and widely. Pseudoscience is spread widely via social media, whilst mainstream media outlets often “spin” scientific news in order to create more sensational stories. It is therefore hugely important to counter this sort of misinformation by communicating science clearly, accurately and engagingly. The ability to take complex concepts and explain them in simple language is a hugely valuable skill. Part B of this tutorial series is therefore intended to make you consider more deeply the importance of communicating complex science to general audiences.

**For Part B of this tutorial series, you will have to prepare a short (250 word) piece of text in advance, for discussion with the two tutors at the live tutorial session**. Further instructions are provided below:

* 1. Please read the following lay summary article written for National Geographic:

<https://www.nationalgeographic.com/science/phenomena/2014/11/11/contaminomics-why-some-microbiome-studies-may-be-wrong/>

and then read the original research article by Salter *et al* that it is based upon:

<https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-014-0087-z>

* 1. Write a very short (maximum of 250 words) “Importance Statement” based on the original research article by Salter *et al* shown above, where you briefly summarise the main findings of the study, and highlight the potential wider significance. This should be written with a general public audience in mind. Avoid technical jargon, and try and convey accurately the main take home messages in plain and simple language that would be understood by a lay audience. Try imagining reading it to your non-science background friends and family. Would they understand it? This MUST be written and submitted prior to the synchronous session (**by noon on Friday September 29th at the latest**), so that the tutor can discuss the content of your Importance Statement with you during the session. This feedback should be helpful when writing your final 800 word lay summary essay, as outlined on Pages 4 to 6 of this handbook.
  2. For the tutorial session, also come prepared to discuss what you think makes for effective scientific communication. Are there popular science articles you have enjoyed? If so, what made them enjoyable? Conversely, have you read any bad articles (or memes via social media)? Why were they bad? What would you have done differently to communicate the science more accurately and effectively?

At the end of Parts A and B, you will be expected to put all you have learned into practice. You will critically assess a published scientific article, and then write a short (800 word) **lay summary** based on that article, which conveys the complex science in more simple language (see Pages 4 to 6 of this handbook for more details).

University Policies

Students are asked to make themselves familiar with the information on key education policies, available [here](https://www.abdn.ac.uk/staffnet/teaching/key-education-policies-for-students-11809.php). 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 how the University will calculate your degree outcome.

These University wide education policies should be read in conjunction with this programme and/or course handbook, in which School specific policies are detailed. These policies are effective immediately, for the 2023/24 academic year. Further information can be found on the [University’s Infohub webpage](https://www.abdn.ac.uk/students/) or by visiting the Infohub.

The information included in the institutional area for 2023-24 includes the following:

* Assessment
* Feedback
* Academic Integrity
* Absence
* Student Monitoring/ Class Certificates
* Late Submission of Work
* Student Discipline
* The co-curriculum
* Student Learning Service (SLS)
* Professional and Academic Development
* Graduate Attributes
* Email Use
* MyAberdeen
* Appeals and Complaints

Where to Find the Following Information:

C6/C7- University of Aberdeen Homepage > Students > Academic Life > Monitoring and Progress > Student Monitoring (C6 & C7)

https://www.abdn.ac.uk/students/academic-life/student-monitoring.php#panel5179

Absences- To report absences you should use the absence reporting system tool on Student Hub. Once you have successfully completed and sent the absence form you will get an email that your absence request has been accepted. The link below can be used to log onto the Student Hub Website and from there you can record any absences you may have.

[Log In - Student Hub (ahttps://www.abdn.ac.uk/studenthub/loginbdn.ac.uk)](https://www.abdn.ac.uk/studenthub/login)

Submitting an Appeal- University of Aberdeen Homepage > Students > Academic Life > Appeals and Complaints

https://www.abdn.ac.uk/students/academic-life/appeals-complaints-3380.php#panel2109

Academic Language & Skills support

For students whose first language is not English, the Language Centre offers support with Academic Writing and Communication Skills.

Academic Writing

* Responding to a writing task: Focusing on the question
* Organising your writing: within & between paragraphs
* Using sources to support your writing (including writing in your own words, and

citing & referencing conventions)

* Using academic language
* Critical Thinking
* Proofreading & Editing

Academic Communication Skills

* Developing skills for effective communication in an academic context
* Promoting critical thinking and evaluation
* Giving opportunities to develop confidence in communicating in English
* Developing interactive competence: contributing and responding to seminar discussions
* Useful vocabulary and expressions for taking part in discussions

More information and how to book a place can be found [here](https://www.abdn.ac.uk/study/international/language-centre.php)

Medical Sciences Common Grading Scale

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Grade | Grade Point | % Mark | Category | Honours Class | Description |
| A1 | 22 | 90-100 | 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 | 85-89 |  |
|  |
| A3 | 20 | 80-84 |  |
|  |
| A4 | 19 | 75-79 |  |
|  |
| A5 | 18 | 70-74 |  |
|  |
| B1 | 17 | 67-69 | 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 | 64-66 |  |
|  |
| B3 | 15 | 60-63 |  |
|  |
| C1 | 14 | 57-59 | 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 | 54-56 |  |
|  |
| C3 | 12 | 50-53 |  |
|  |
| D1 | 11 | 47-49 | 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 | 44-46 |  |
|  |
| D3 | 9 | 40-43 |  |
|  |
| E1 | 8 | 37-39 | 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 | 34-36 |  |
|  |
| E3 | 6 | 30-33 |  |
|  |
| F1 | 5 | 26-29 | Clear Fail | Not used for Honours | • Contains major errors or misconceptions • Poor presentation |  |
|  |
| F2 | 4 | 21-25 |  |
|  |
| F3 | 3 | 16-20 |  |
|  |
| G1 | 2 | 11-15 | Clear Fail/Abysmal |  | • Token or no submission |  |
|  |
| G2 | 1 | 1-10 |  |
|  |
| G3 | 0 | 0 |  |
|  |

# MC4014 Course Timetable: 2023-2024

* **Times** are UK Time on campus.
* **Timetable Key:**

|  |
| --- |
| Blue = Live session (face-to-face) |
| Grey = No scheduled classes for this course on these days |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Week 8 | | | | | |
| Date | Time | Place | Subject | Session | Staff |
| Mon 18 Sep | 3 – 4 pm | Polwarth  1M:003 | Lecture 1 – Welcome/Molecular microbial profiling methods (1) | Lecture | Dr A Walker |
| Tue 19 Sep | 3 - 5 pm | Polwarth  Computer  Room 3 | Bioinformatics workshop | Workshop | Dr A Walker  Dr I Mukhopadhya |
| Wed 20 Sep |  |  |  |  |  |
| Thu 21 Sep |  |  |  |  |  |
| Fri 22 Sep |  |  |  |  |  |
| Week 9 | | | | | |
| Date | Time | Place | Subject | Session | Staff |
| Mon 25 Sep | 3 - 5 pm | Polwarth  1M:003 | Microbiology Research Tutorial - Part A | Tutorial | Dr D Childers  Dr A Walker |
| Tue 26 Sep |  |  |  |  |  |
| Wed 27 Sep |  |  |  |  |  |
| Thu 28 Sep |  |  |  |  |  |
| Fri 29 Sep |  |  |  |  |  |
| Week 10 | | | | | |
| Date | Time | Place | Subject | Session | Staff |
| Mon 2 Oct | 2 – 4 pm | Polwarth  1M:003 | Microbiology Research Tutorial – Part B | Tutorial | Dr A Walker  Dr D Childers |
| Tue 3 Oct | 11 am – 12 noon | Polwarth  1M:003 | Lecture 2 - Human gut virome (1) | Lecture | Dr I Mukhopadhya |
| Wed 4 Oct |  |  |  |  |  |
| Thu 5 Oct |  |  |  |  |  |
| Fri 6 Oct |  |  |  |  |  |
| Week 11 | | | | | |
| Date | Time | Place | Subject | Session | Staff |
| Mon 9 Oct |  |  |  |  |  |
| Tue 10 Oct | 11 am – 12 noon | Polwarth  1M:003 | Lecture 3 - Human gut microbiology (1) | Lecture | Dr S Duncan |
| 3 - 5 pm | Polwarth  1M:003 | Lecture 4 & 5 - Human gut microbiology (2 & 3) | Lecture | Dr S Duncan |
| Wed 11 Oct |  |  |  |  |  |
| Thu 12 Oct |  |  |  |  |  |
| Fri 13 Oct |  |  |  |  |  |
| Week 12 | | | | | |
| Date | Time | Place | Subject | Session | Staff |
| Mon 16 Oct | 3 – 5 pm | Polwarth  1M:003 | Lecture 6 & 7 - Antibiotic resistance (1 & 2) | Lecture | Prof K Scott |
| Tue 17 Oct |  |  |  |  |  |
| Wed 18 Oct |  |  |  |  |  |
| Thu 19 Oct |  |  |  |  |  |
| Fri 20 Oct |  |  |  |  |  |
| Week 13 | | | | | |
| Date | Time | Place | Subject | Session | Staff |
| Mon 23 Oct |  |  |  |  |  |
| Tue 24 Oct | 9 – 10am | Polwarth  1M:003 | Q & A session | Tutorial | Dr P Louis |
| 1 – 3 pm | Polwarth  1M:003 | Lecture 8 & 9 - Gene regulation (1 & 2) | Lecture | Dr P Louis |
| Wed 25 Oct |  |  |  |  |  |
| Thu 26 Oct |  |  |  |  |  |
| Fri 27 Oct |  |  |  |  |  |

Campus Maps - Foresterhill



Polwarth Floor Plans

Diagram, schematic

Description automatically generated

Diagram

Description automatically generated

Diagram

Description automatically generated