

## Course Information / Ngā Whakamārama - 2024

### **BIOL/BCHM459**

#### **Genomics**

0.125 EFTS    15 Points  
Semester 2

#### **Description / Whakamahuki**

Genomics is an integrally important part of biology. Through the sequencing, characterisation, and study of DNA, it is now possible to decode the complete genetic complement of any organism. Genome science is revolutionising almost all fields of biological enquiry. In this course we will look at the genomic technologies that are transforming biology, the biological and evolutionary insights arising from genome research, and the process of genome sequencing, from start to finish.

You will learn about genome sequencing, annotation and the analysis of genomes using various types of genomic data and bioinformatics tools: the course will be based around the analysis and interpretation of genomic (bacterial genome), gene amplicon sequencing and the identification, annotation, and analysis of genes or sets of genes from whole-genome assemblies.

Tutorials will be structured around the practical investigation of genomic data and discussion of assigned papers. Seminars will cover topics such as advanced genome annotation and analysis, metabarcoding pipelines and analysis of outputs from whole-genome assemblies. The course will be project-based and may involve some group work.

#### **Course Coordinator / Kairuruku Akoranga**

Prof. Matthew Stott, Room 537 Julius von Haast, ext 92511  
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#### **Teachers / Pūkenga**

Dr. Craig Herbold, Room 532 Julius von Haast, ext 92692

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Matt Walters, Scientific Communication Specialist, Room 432 Julius von Haast, ext 95211

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A/Prof Paul Frandsen, visiting Erskine Fellow, Brigham Young University, Utah, United States

#### **Graduate Profile | Āhuatanga Taura**

This course will provide students with an opportunity to develop these UC Graduate Attributes (GP):

- GP1 Critically competent in a core academic discipline.
- GP2 Employable, innovative and enterprising.
- GP5 Globally aware

## Intended Learning Outcomes (Hua Akoranga)

*As a student in this course, I will develop:*

- An up-to-the-minute knowledge of methods in genomics (*assessment task: Projects 1, 2, and 3*)  
**Related graduate attributes:** GP1, GP2, GP5
- An understanding of genomics as a tool for answering biological questions (as opposed to a means of generating data for the sake of it) (*assessment task: Projects 1, 2, and 3*)  
**Related graduate attributes:** GP1, GP2, GP5
- Reading skills required to navigate, understand and question scientific literature (*assessment task: Projects 1, 2, and 3*)  
**Related graduate attributes:** GP1, GP2, GP5
- Experience in writing in the style of project proposals and scientific papers (*assessment task: Projects 1, 2, and 3*)  
**Related graduate attributes:** GP1, GP2, GP5
- Experience in scientific collaboration involving data analysis, interpretation and presentation of results (*assessment task: Projects 1, 2, and 3*)  
**Related graduate attributes:** GP1, GP2, GP5

## Transferable Skills / Pūkenga Ngaio

*As a student in this course, I will develop the following skills:*

- Understand genomic methods and results presented in research papers and technical reports. The ability to critically evaluate and interpret genomic information is essential in higher level courses and in research  
**Related graduate attributes:** GP1, GP2, GP5
- Have the ability to apply advanced genomic analysis concepts. This is important for distinguishing different types of genetic variation and their potential functional impacts and is broadly applicable to multiple research fields  
**Related graduate attributes:** GP1, GP2, GP5
- Basic knowledge of how samples and data are collected for generation of genomic information. This is broadly applicable across multiple research fields  
**Related graduate attributes:** GP1, GP2, GP5
- Knowledge of statistical analysis of genome data, essential for higher level courses and across research and employment sectors  
**Related graduate attributes:** GP1, GP2, GP5
- The ability to know which method to apply to which dataset, which is essential in further research in all areas of genomics  
**Related graduate attributes:** GP1, GP2, GP5
- Communication skills – the ability to describe what results mean in the context of the problem, and being able to explain the results to someone else is essential for any professional career  
**Related graduate attributes:** GP1, GP2, GP5

**Timetable - A total of six seminars will be held. Check your timetables for locations, as these may change at short notice.**

Seminars:

Seminar number	Focus	Assessment
1 (18/7)	Intro to practical computing for biologists	<b>Due Wed 31 July 2024</b> 10% of final grade
2 (1/8)	How to use regular expressions in biological computing	<b>Due Wed 14 Aug 2024</b> 20% of final grade
3 (15/8)	Whole genome sequencing introduction and pipeline demonstration	<b>Due Wed 11 Sept 2024</b> 15% of final grade
4 (12/9)	Whole genome sequencing – troubleshooting and discussion about poster design	<b>Due Wed 25 Sept 2024</b> 15% of final grade
5 (26/9)	Identification, annotation, and analysis of genes or sets of genes from whole-genome assemblies	TBC
6 (10/10)	Identification, annotation, and analysis of genes or sets of genes from whole-genome assemblies	TBC

### **Assessment / Aromatawai**

There are THREE project-based modules for BIOL459, with assessments for each comprising 30% of your final grade. 10% of your final grade is reserved for participation and contribution. There is NO final exam for BIOL459, so it is important that you engage and contribute. You will be provided with guidelines regarding the scope and depth of your written report for each of the three assessments. Where appropriate (we will let you know where this may be), you may work in groups to produce your outputs for each assessment, however each student will need to produce their own final assessment for each of the three projects.

Note that the course will be subject to the Biology policy on late submission of work (see below).

### **Class material on Learn (Ako) & use of Turnitin**

Resources used or referred to will be available on-line on the course link in Learn.

Please also note that we will be requesting that you submit written work in both hard copy (for grading) and in electronic form (for assessment of originality using “Turnitin”). Instructions will be given on how you do this via Learn.

## RULES, REGULATIONS, AND WHAT TO DO WHEN THINGS GO WRONG

[updated March 2023]

**If in doubt:** ASK! The course coordinator is happy to answer questions. All staff involved in the course are available for advice on specific issues.

### What do I do if I have to miss a test/exam or if my performance was impaired?

In Biological Sciences, we require a satisfactory level of achievement in both the theoretical aspects of the discipline and in practical activities. **This means you must attend all class activities (labs, tutorials, fieldtrips)** and submit all items of assessment unless you have a very good reason not to (e.g. medical reasons) and if this has been approved by your course coordinator.

If you feel that **illness, injury, bereavement or other extenuating circumstances beyond your control** prevented you from completing a **test/exam** worth 10% or more of the total course assessment, or if these circumstances affected your performance in such assessments, you should apply for Special Consideration. Applications for Special Consideration should be submitted via the Special Consideration website <http://www.canterbury.ac.nz/study/special-consideration/> *within five working days* of the assessment or its due date. You should also notify the course coordinator. If you apply for Special Consideration because of medical reasons, you should visit a doctor within a reasonable timeframe (application form available on the website above or from the Student Health Centre).

The Special Consideration provisions are intended to assist students who have covered the work of a course but have been prevented by illness or other critical circumstances from demonstrating their mastery of the material or skills at the time of a text/exam – **they do not excuse you from doing the test/exam** within a reasonable time agreed with the course coordinator.

### What do I do if I have to miss a quiz or assignment or if I need an extension?

You cannot apply for Special Consideration if you miss an assessment that is not a test/exam, such as a quiz, lab report, essay, literature review or other assignment, or if the test/exam is worth less than 10% or more of the total course assessment. If this happens or if you need an extension because of **illness, injury, bereavement or other extenuating circumstances beyond your control**, please contact the course coordinator and arrange an alternate activity and/or submission date. You should also do this if you have to miss a laboratory, tutorial or field trip.

### What are other valid reasons to miss an assessment or mandatory course activity?

The Special Considerations policy (<https://www.canterbury.ac.nz/about/governance/ucpolicy/student/special-consideration-procedures-and-guidelines/>) outlines only a few kinds of activities that UC considers valid reasons for missing an assessment or mandatory course activity other than those outlined above. These include **involvement in international or national representative sport or cultural groups**. Holiday trips, birthday parties, weddings, work-related commitments etc. are not given special status in this University policy. Please contact your course coordinator to ask for an alternate activity and/or submission date if you are eligible.

### Special Consideration for late discontinuation of a course

Students prevented by **extenuating circumstances** from completing the course after the final date for withdrawing, may apply for Special Consideration for late discontinuation of the course. Applications must be submitted via <http://www.canterbury.ac.nz/study/special-consideration/> no later than five working days after the examination period has finished.

### Academic Integrity

It is the responsibility of each student to be familiar with the definitions, policies and procedures concerning academic misconduct/dishonest behaviour. Instances of academic misconduct will be dealt with in a serious and appropriate manner. Students should refer to: <https://www.canterbury.ac.nz/about/ako/academic-quality/academic-integrity/>

### Plagiarism

It is essential that you are aware that plagiarism is considered a very serious offence by the academic community, the University and the School of Biological Sciences. Plagiarism is defined as taking content from another work or author and presenting it, without attribution, as if it is your own work. Content here includes text (sentences or major parts of sentences), display items (graphs and tables), and overall structure (the detailed sequence of ideas). Plagiarism includes:

- re-use of previous assignments (even if each individual sentence has been rephrased to say the same thing in different words, if the overall structure is re-used).
- copying of another student's work (with or without their consent).
- the unreferenced use of published material or material from the internet, e.g. cutting and pasting of paragraphs or pages into an essay.
- the generation of text using artificial intelligence technology without disclosure and when it is not intended to be part of an assignment.

For most pieces of in-term assessment you will be given information concerning the use of direct and indirect quotes from previously published work. If you have any doubt about the appropriate use of published material, please speak with an academic staff member. If you are unsure what plagiarism is, seek advice.

It is a School policy that courses will likely that you submit work electronically for subsequent analysis of originality using *Turnitin*. Students agree that by taking courses in BIOL, assessments may be submitted to Turnitin.com for textual similarity review. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Terms and Conditions of Use as posted on the Turnitin.com site.

#### **Where do I hand in assignments and then collect them once marked?**

All assignments should be submitted as directed by the course coordinator. Typically, this will be electronically via Learn for on-line grading and for analysis in *Turnitin*. If a hard copy is requested, assignments should be placed in the designated collection boxes in the foyer of the 2nd floor of the School of Biological Sciences (Julius von Haast building, at the top of the stairs). All assignments must be accompanied by a cover sheet signed by you stating that the submitted work is not plagiarised. Cover sheets are available on top of the collection boxes, or you can download one from the Biology website (<http://www.canterbury.ac.nz/media/documents/science-documents/assignment-coversheet.pdf>).

Marked assignments will be returned through Learn or, if in hard copy, can be collected from the School of Biological Sciences reception, unless directed otherwise by the course coordinator. Teaching staff will endeavour to return work as soon as possible, and should contact you if there are likely to be any delays that will prevent return within the maximum 4-week timeframe.

#### **What if I can't get it finished in time?**

Reports and assignments should be handed in on time. Extensions may be granted if you have a valid reason (see above). **If you require an extension, you should request one from the course coordinator** (or the lecturer responsible for marking the work), with as much notice as possible. Please do this BEFORE the deadline for the assignment. **If you have been given an extension and you have been asked to submit a hard-copy of your work, you should hand the work DIRECTLY to the course coordinator** (do not put it in the drop box as it may not be cleared after the due date).

If an extension has not been granted:

- work handed in within 1 hour of the deadline: penalty of up to 5 percentage points of the mark for the assignment (e.g., a mark of 75% might be reduced to 70%).
- work handed in 1 – 24 hours after the deadline: penalty of 10 percentage points of the mark for the assignment (e.g., a mark of 75% is reduced to 65%).
- work handed in 1 – 7 days after the deadline: penalty of 15 percentage points of the mark for the assignment (e.g., a mark of 75% is reduced to 60%).
- work handed in more than 7 days after the deadline will not be marked or earn credit.

#### **What if I have written more than the word or page limit?**

If there is a word limit on an assignment, it is usually there to stop you doing too much work and to encourage you to write succinctly. You can be up to 10% over without too much worry, but if the length increases beyond that your mark may suffer due to failure to follow the requirements. If you find yourself way over the word limit talk to the lecturer concerned about how to get your assignment to an acceptable length. Unless specifically advised that there is flexibility, you must adhere to the word limit indicated.

#### **What if I fail part of the course?**

In Biological Sciences, we require a satisfactory level of achievement in both the theoretical aspects of the discipline and in practical activities. This means you must attend all class activities and submit all items of assessment unless you have a very good reason not to (e.g. medical reasons). **A student must attain an average score of at least 40% for in-course assessments (e.g. assignments, reports, quizzes) and an average score of at least 40% in the exam and/or tests, AND score at least 50% overall for the course, to be awarded a passing grade. See the course outlines for clarification of the assessment items included in each category and ask the coordinator if you are still unsure.**

#### **What's the best way to give feedback?**

We welcome constructive feedback at all times – help us to make this a valuable course for you. We endeavour to remain approachable at all times. If you would rather give feedback anonymously, please use the online course survey or talk to lab demonstrators, or your class rep (who will all report back to the staff-student liaison committee that includes a representative from each of the undergraduate classes). Class representatives will be selected from each class at the start of course.

#### **What's the best way to complain?**

If you feel you have not been fairly treated during this course, please raise the issue with the lecturer or course coordinator in the first instance. Other avenues include your class rep., who can raise issues anonymously, or the UCSA education coordinator.

#### **Grading**

A+	90% or above
A	85 – 90
A-	80 – 84

B+	75 – 79
B	70 – 74
B-	65 – 69
C+	60 – 64
C	55 – 59
C-	50 – 54

A restricted pass (R) **may** be awarded to those who are close to a pass (i.e. an overall score of 48-49.9%) AND who have achieved at least a 40% overall score in both in-course assessment and tests/exams. If an R grade is awarded you gain credit for the course but **cannot continue into papers that require this course as a pre-requisite**. NB. The R grade is only available at 100 and 200 level - it cannot be awarded for third year papers.

Failing grades: D 40-49            E 0–39