School of Biological Sciences
Te Kura Pūtaiao Koiora

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Ngā Whakamārama / Course Information- 2024

BIOL333
GENETICS

0.125 EFTS 15 Points
First Semester

Whakamahuki / Description
We will cover advanced formulations of genes (beyond DNA), complex interactions between genotype and environment, and discuss genome evolution (e.g, when do collections of genes become genomes?).

You should expect this course to be a significant "step up" from stage 200. Prepare for this by:

- reserving more time for self study (see below);
- taking responsibility for identifying what you don't know and using all available contact time to seek answers;
- *completing assigned readings and assignments in advance of lectures, tutorials and labs*;
- asking questions;
- completing optional problem sets;
- self-testing by using questions in the recommended textbooks;
- organising or joining a study group.

Prerequisite for entry to BIOL 333 is BIOL 231/BCHM 202.

Goals of the Course
To attain (1) perspective on the complexities of genotype-phenotype-environment interaction at the molecular level; (2) competence in designing and conducting experiments in molecular genetics through thorough understanding of theory and technique; and (3) to recognise the source of controversy in genetic sciences and practice the role of critic and conscience.

Āhuatanga Taura / Graduate Profile
This course will provide students with an opportunity to develop these UC Graduate Attributes (www.canterbury.ac.nz/study/graduate-profile/students/what-are-the-graduate-attributes/):
Graduate Profile (GP) 1. Critically competent in the core academic discipline; 2. Employable, innovative and enterprising; 3. Bi-cultural confidence and competence; 4. Engaged with the community; 5. Globally aware.

Hua Akoranga (Intended Learning Outcomes) and Aromatawai (Associated Assessment)
As a student in this course, I will:
Learning Outcome Number 1 (LO1)
anticipate and diagnose phenotypic effects of genome-, transcriptome-, and proteome-level reactions through mastery of the enzymology (assessment tasks: problem sets and final assignment). GP1
Learning Outcome Number 2 (LO2)
design new gene circuits (assessment task: laboratory assignments and problem sets). GP1
Learning Outcome Number 3 (LO3)
understand and interpret experimental evidence in the discipline of genetics (assessment task: laboratory assignments, problem sets and final assignment). GP1
Learning Outcome Number 4 (LO4)
perform advanced calculations and manipulations for setting up reactions *in vitro* (assessment task: laboratory assignments and flowsheets). GP1
Learning Outcome Number 5 (LO5)
formulate hypotheses to guide my own learning process (assessment task: laboratory assignments, course test and final assignment). GP1
Learning Outcome Number 6 (LO6)

demonstrate awareness of Te Tiriti o Waitangi. Te Tiriti recognises the role and responsibility of all citizens to respect the foundation of Aotearoa and its bi-cultural partnership (assessment task: job interview). GP3:KP4,7
Learning Outcome Number 7 (LO7)
manage my time to achieve better outcomes. Deadlines are not targets. Set your own target completion times to avoid missing deadlines (assessment task: prepare a time schedule for the semester). GP2

Pūkenga Ngaio / Transferable Skills Register
As a student in this course, I will develop the following skills:

- Scientists may work in areas that generate controversy both within their professions and between their professions and broader society. This is both appropriate and to be expected. Academic scientists and students have the responsibility to serve as critic and conscience of society. You will be introduced to this role and be provided with some examples of how to perform it. GP4 and GP5
- Framing questions and asking them. This will be important for any career in research, journalism or business where you will need to form judgments based on scientific information. We will have tutorials in the course where you are expected to verbally participate and practice this skill. GP2
- Synthesising information. In everyday life and in many job situations you will be required to read information from different sources, construct your own understanding, shape your own viewpoint and express it. *In tutorials and laboratory sessions we will discuss different sources of evidence and types of experiments and how they lead to current understanding.* GP2
- Analysing data. Important for research, police work as well as in a number of private-sector organizations. *As well as working with your own laboratory data, the final assignment for the course requires you to critically analyse scientific data supplied to a government regulator.* GP2
- Ability to prepare for and efficiently conduct practical work in the discipline. This skill will be further developed from previous courses through the use of laboratory work flowsheets, but also by an expectation that the laboratory manual has been thoroughly read in advance and additional readings have been read and understood. GP2
- Time management. Students must be able to complete their study and assignments on time. Juggling multiple courses can be challenging especially because they can have tasks needing to be completed at the same time. Organising your assignments and using the blended functions of this course should help you to minimise timing conflicts between courses. GP2

Graduate Profile (GP) 1. Critically competent in the core academic discipline; 2. Employable, innovative and enterprising; 3. Bi-cultural confidence and competence; 4. Engaged with the community; 5. Globally aware.

Students should note that in the College of Science the average student is expected use a ***minimum*** *of approximately 3 hours of additional* effective *study for each hour of contact. Depending on your preparation and personal circumstances, you may have to invest up to 4.5 hours/contact hour. For this course, that equates to ≥120* ***productive*** *self-study hours.*

Wātaka / Timetable
See University website for times and rooms.
Lectures/tutorial: as per timetable
Labs: See University website for times and rooms.

Kairuruku Akoranga / Course Co-ordinator
Prof. Jack Heinemann
534 von Haast
jack.heinemann@canterbury.ac.nz

Pūkenga / Teachers

Course co-ordinator	Jack Heinemann		Room 534 SBS jack.heinemann@canterbury.ac.nz
	Brigitta Kurenbach	lab technician	brigitta.kurenbach@canterbury.ac.nz

Any queries concerning the course should be directed to the course co-ordinator. He will attempt to answer all queries quickly. **Please try to answer questions about scheduled events by referring to this course outline and use an**

email to the course coordinator about such business as a last resort. If your question can be answered using this handout, you may not receive a reply by email. Queries concerning specific lecturers should be discussed with the lecturer concerned. If that is not possible or comfortable for you, then see the Course Coordinator or Head of School (Prof. Elissa Cameron).

The lecturers are always interested to hear from you what would make your learning experience more rewarding. So please make contact as early in the course as problems or insights occur. Note that we expect students to diligently monitor their email and Learn (Ako) for course announcements. Attendance at lectures is expected and relevant announcements made there may not be repeated elsewhere.

Aromatawai / Assessment

There may be penalties for late submission of work or absence from laboratories and tests. See the "Rules and regulations…" document attached at the end of this course handout. The material covered in both lectures and practical laboratories is assessed. For example, if you are in the M/T stream, you must attend both Monday and Tuesday. To gain a pass in this course a student must do satisfactory practical work in laboratory classes and pass the final test.

BIOL333

Activity	Value (%)	Due Date
Pre-requisite Competence:	8	
numeracy skills quiz 2 (pass/fail)	5	see Learn/Ako pages
content mastery		see Learn/Ako pages
quiz 1	mandatory*	
quiz 2 (pass/fail)	3	
Laboratory:	32 (up to 42)	
attendance	mandatory*	as per your timetable
flowsheet preparation	mandatory*	prior to start of synthetic biology laboratory
skill Olympics (pass/fail)	5	
test	15 (up to 25)**	see Learn/Ako pages
job interview (superior 12 points; satisfactory 9 points; unsatisfactory <6 points)	12	as per your timetable
Modules:	15	
Quizzes and assignments completed and passed	5	see Learn/Ako pages
Final module test	10	see Learn/Ako pages
Tutorials:		
attendance	mandatory*	as per your timetable
Final Project	35-45**	last day of the semester
Total	100	

To gain a pass in this course a student must achieve a mark of 50%.
*Unexcused absence/incomplete may incur a grade penalty. Covid contingency plan:
In the event that it is determined that the Laboratory activities cannot proceed with sufficient confidence of safety to students and staff because of the covid outbreak, then the Tutorials (and associated worksheets) and job interview will be used in place of the Laboratory assessment schedule above.
**Students have a choice to place emphasis on mastery of the laboratory component or final project. Students who opt to not, or fail to, submit a substantive draft of their final projects by the feedback due date (see AKO/Learn pages) will automatically increase the weighting of their laboratory test to 25 points and decrease the final project to 35 points. Students who receive a pass on their feedback submission will have a choice to increase the weight of the laboratory test or to keep it at 15 points.

Summary of course contents

Topics
Academic freedom
Advanced gene concepts – discovery to epigenes
Transcriptome reactions and complexity
Proteome reactions and diversity
Sources of DNA variation
- mutation and mutators
- horizontal gene transfer
- genome editing

Course Textbook

Molecular Biology Principles of Genome Function 3rd Ed. by Craig *et al*. This text is the best for BIOL231 and BIOL333.

Note that Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R. Molecular Biology of the Gene, 7th Edition, Lehninger Principles of Biochemistry 6th Ed., and Prescott's Microbiology 9th Ed (Willey, Sherwood and Woolverton), are also useful and were historically used this course. If you are a biochemistry or microbiology student and not planning to take more genetics courses, then you may wish to buy only the core text for your programme. Some

material will be taken from Snyder and Champness **Molecular Genetics of Bacteria**, 3rd Ed. These are also available in the Library.

Reading and study

Readings are assigned by individual lecturers. Expect to read additional assigned material such as review or research articles. It is your responsibility to make the best use of contact time, such as spare time during the laboratory, to achieve an understanding of the material. (Leaving the lab early is a lost opportunity.)

The Lab Manual is available only as an electronic resource. You are expected to bring the genotype and media list and your flowsheet on the day.

AKO / LEARN

This course is supported by Learn / Ako. You will find electronic copies of lecture notes and other material distributed solely by this method. The course is attempting to be as environmentally friendly as possible, so you will receive a minimum of "paper" handouts.

Help with writing
Your work may well benefit if it's seen by a learning advisor at the Learning Skills Centre prior to submission. Early in the writing phase is best: that's when learning advisors can address the critical issues of clarity, structure and organisation. They also offer tips on referencing, grammar, punctuation, and good written style. You can have a quick, informal chat with a learning advisor if you drop in to LSC at South Bank (next to the pharmacy, UCSA building) during their Quick Queries times, Mon–Fri, 10am–2pm, or you can make an appointment for an individual consultation by calling 364 2314. See www.learningskills.canterbury.ac.nz for LSC workshops and lectures on writing and study skills.

RULES, REGULATIONS, AND WHAT TO DO WHEN THINGS GO WRONG
[updated January 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.

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

A-	80 – 84
B+	75 – 79
B	70 – 74
B-	65 – 69
C+	60 – 64
C	55 – 59
C-	50 – 54

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