

Course Information / *Ngā Whakamārama* - 2024

BIOL 355

Neurons, Hormones and Behaviour

0.125 EFTS 15 Points

Semester 1

Description/ *Whakamahuki*

Largely through the use of case studies, this course will cover how, and why, nervous systems communicate. Sensory systems imaginable and unimaginable to us will be explored, as well as how learning physically happens. It will also cover the general principles of communication via the endocrine system, hormonal control of basic behaviours, such as feeding, social behaviour and pair bonding. These subjects will be taught with a strong emphasis on their adaptive value to the animal. This course is suited to anyone interested in how different animal minds work, and how these interface with the environment through the sensory and endocrine systems.

Reading of recent books and scientific papers is an *essential* adjunct to the lectures, and development of the ability to evaluate such readings is an important objective for the course.

Goals of the Course

This course is intended to provide a broad understanding of how animals interact with their environment. The primary aim of the course is to provide an **understanding of the nervous and endocrine systems, particularly with respect to their importance in the behaviour of organisms**. This course will stand alone, but is designed to link with BIOL250 Principles of Animal Physiology and to provide a strong theoretical platform for students interested in Animal Behaviour.

Course Coordinator / *Kairuruku Akoranga*

Ximena Nelson; Room 336 (Julius von Haast)

Lecturers / *Pūkenga*

Ximena Nelson: ximena.nelson@canterbury.ac.nz

Elissa Cameron: elissa.cameron@canterbury.ac.nz

Students should note that in the Science Faculty the average student is responsible for approx. 4.5 hours of additional study for each hour of lecture at the 300-level.

Lectures *Starting first week of term 1*

See Course Information System for timetable:

<http://www.canterbury.ac.nz/courseinfo/GetCourses.aspx?orgunitcode>

All lectures start on the hour.

Laboratories (every other week throughout Semester 1)

Laboratories will take place **every other week, commencing in week 2 of term 1**. See Course Information System for location. Laboratories will consist of five 3 to 4-hour labs. You need to allocate yourself to **one** stream (one lab/week). Lab coats and closed shoes are *essential*.

Laboratories illustrate principles covered in the lectures, introduce you to methods of computer data acquisition and analysis, and include both human and animal subjects. Assessment is based on laboratory write-ups to be handed in at the end of each lab.

Laboratory schedule. See Course Information System for timetable and location:

<http://www.canterbury.ac.nz/courseinfo/GetCourses.aspx?orgunitcode>

Lab 1 Crayfish escape and territorial behaviour, Ximena Nelson

Lab 2 Reflexes and reaction times, Ximena Nelson

Lab 3 Cockroach escape response, Ximena Nelson

Lab 4 Sensory physiology, Ximena Nelson

Lab 5 Stress responses in mice, Elissa Cameron

Learning Outcomes / *Hua Akoranga* and Associated Assessment / *Aromatawai*

In this course, I will develop critical competence in the core academic discipline through:

- Explaining the mechanisms that enable animals to interact with their surroundings from an evolutionary framework (*assessment task: laboratory write-ups; GA: Mastery of discipline*).
- Thorough comprehension and ability to explain how animals work; particularly whole-body regulation and integration (*assessment task: laboratory write-ups; GA: Mastery of discipline*).
- Knowing how to interpret and synthesise technical scientific primary literature (*assessment task: exams involve readings on Learn; GA: Mastery of discipline*)
- Application of technical interdisciplinary skills in neurobiology, endocrinology and behaviour, such as interpreting oscilloscope data (*assessment task: laboratory write-ups, demonstrator checks; GA: Mastery of discipline*).
- Becoming descriptively familiar with modern experimental techniques (*assessment tasks: exams, laboratory write-ups; GA: Mastery of discipline, employability, innovation & enterprise*).
- Being able to formulate a broad overview of theory and practice of behaviour, neurophysiology and endocrinology across a range of systems (*assessment task: exams; GA: Mastery of discipline*).
- High-level comprehension of how the nervous and endocrine systems contribute to behaviour and ability to analyse the effect of societal norms has on perception and scientific endeavour (*assessment task: exams; GA: Mastery of discipline, employability, innovation & enterprise, cultural competence*).
- Ability to extrapolate in-depth knowledge from ‘model organisms’ and infer to other animals and to human endeavours and (bio)technology (*assessment task: exams; GA: Mastery of discipline, employability, innovation & enterprise, global awareness*).

Transferable Skills / *Pūkenga Ngaio*

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

- Transferability of core concepts. Important for research, policy-making and in private-sector organizations. *We will use case studies and real-world examples to demonstrate the use of understanding core concepts in depth and applying those concepts to novel situations or systems. (Engaged with the Community; Globally Aware)*
- Collecting and interpreting lab data. Important for research and in governmental and non-governmental organizations. *We will conduct research activities in the lab to provide both the real-world context for lectures and to develop hands-on skills in data collection and interpretation. (Engaged with the Community; Globally Aware)*
- Analysing data. Important for research, as well as in a number of private-sector organizations. *Condensing raw data into meaningful values and then assessing the resulting trends is a key skill in a number of vocations, both within science and in other areas. This skill will be further*

developed when we assist you to analyse the data we generate in the lab. (Employable, innovative and enterprising)

- Practical operation of a physiological data recording system. *The PowerLab system, or the equivalent, is a critical tool in almost all real-world scenarios that involve the recording of physiological data (e.g. exercise, research, and hospital laboratories). (Employable, innovative and enterprising)*

Student Feedback (max. score = 5)	2017	2023
Materials helped me understand.	4.6	4.5
The organisation of this course helped me learn.	4.6	4.8
The workload was appropriate.	4.3	4.6
The assessments were appropriate.	4.3	4.7
Feedback on assessments was helpful.	4.3	4.3

Student feedback. The responses were collated by the course coordinator. **Action taken in response to feedback is indicated in bold.**

- The case studies were very good in helping me understand the key concepts of this course
- The quantity of examples and ability to translate processes to organisms in the real-world environments was very helpful to learning
- I would have liked an essay as well as the other assessments. **We consider this is too much assessment for this course, but will consider it if we get similar requests in future.**
- The laboratories were fantastic and thought provoking
- Some of the readings felt a bit too detailed for what we were learning. **We rely on primary sources of material in this course, which does mean that the level is sometimes higher than that expected for the course. We endeavour to highlight that you do not need to learn any more detail than that discussed in class.**

What advice would you give a friend taking BIOL355 to help them with the course?

- I never did the readings or looked at the lecture before going in. I should have though

BiCC touchpoints

Traditional and contemporary realities of Māori society, e.g.; tikanga and kawa, te reo Māori (Discussion of impact of cognitive bias on health, addiction, synthetic oestrogens, impact of medicines on animal sex); The process of colonisation and globalisation (Discussion of impact of cognitive bias on health, addiction, synthetic oestrogens, impact of medicines on animal sex); A process of self-reflection on the nature of 'knowledge' and 'norms' (Understanding of how the nervous and endocrine systems contribute to behaviour and an understanding of the effect of societal norms has on perception and scientific endeavour)

Electronic Distribution of Course Material

Information about the course, including the course handout, notices, summaries of lectures and other details will be placed on Learn.

Course Requirements

To pass the course a student must do satisfactory practical work in laboratory classes as well as performing satisfactorily in the in-term test and the final examination. To satisfy the requirements of the course students must complete all items of assessment. Exceptions to this will only be made under circumstances described in the University Regulations. A special consideration pass in BIOL355 requires satisfactory performance in either the in-term test or the final examination, and in at least half of the laboratory work.

Attendance at ALL laboratories is a requirement of the course, and, to explain any absence, a medical certificate or other appropriate evidence must be provided to the laboratory instructor.

From time-to-time notices about the course will be sent via email. It is assumed that all members of the class regularly check their email accounts on the UC student system. Lecture notes and other course material will be placed on Learn.

Assessment / *Aromatawai*

Laboratory write-ups	30%	Completed during all laboratories
Mid-course test (1 st 9 lectures)	35%	roughly 27-31 March (2 hours); TBA
Final Examination (2 nd 9 lectures)	35%	June examination period (2 hours)

Each laboratory has a worksheet that needs to be handed in by students at the end of each lab. Each of these is worth 6% (special consideration for an individual laboratory, being <10%, will not be given; see rules and regulations below). The sum of the laboratory write-ups will contribute to 30% of the final grade.

Note that the School has minimum grades that must be achieved in both the ‘in term’ assessments and the final exam in order to pass the course (see rules and regulations below). For this course, the ‘in term’ work comprises the laboratory write-ups and the mid-course test. You must complete all of these assignments and obtain at least 40% to pass the course. A student must also obtain at least 40% on the final exam, and 50% overall, to pass the course.

What is expected in assessments?

The expectations for assessment items relate to the learning outcomes above. A general marking rubric is as follows:

- A to A+ : Evidence that the student has developed an individual conception of the subject from wide reading and reflection. This individual understanding will likely be applied to a novel situation/organism.
- B+ to A- : Evidence of strategic reading from a few sources, and the ability to present lecture content in the student’s own words.
- C to B: Reproduction of lecture content following the structure used by the lecturer.
- D to C- : Reproduction of some lecture content without clear structure.
- E : Confusion of content or no meaningful content presented beyond knowledge that would be expected at the start of the course.

Reading / *Pukapuka Ako*

There is no course textbook for BIOL355. Instead, required reading in the form of scientific papers will be provided to students as links to primary material on Learn. **To do well in final exam you must show evidence that you have read and understood at least some of this material.**

However, the following books available in the library are useful for some topics:

- Simmons, P. & Young, D. 2010. *Nerve cells and animal behaviour*. 3rd ed. Cambridge University Press.
- Young, D. 1989. *Nerve cells and animal behaviour*. 1st ed. Cambridge University Press.
- Carew, T. J. 2000. *Behavioral neurobiology: the cellular organization of natural behavior*. Sinauer Associates.
- Zupanc, G. K. H. 2004. *Behavioral neurobiology: an integrative approach*. Oxford University Press.
- Sherwood, I., Klandorf, H., & Yancey, P. 2005. *Animal physiology: from genes to organisms*. Thomson, Brooks/Cole.

Students with Disabilities

Students with disabilities should speak with someone at the Equity & Disability Service, if you have not already done so (<https://www.canterbury.ac.nz/equity-disability/>). Please speak to the course coordinator at least one week before any course activity for which you have a special requirement.

Prerequisites

BIOL250; BIOL272 is recommended

Course content / *Hōtaka* (subject to minor changes)

Ximena Nelson- Nervous systems and behaviour

1. Introduction to physiology and behaviour
2. Crayfish escape behaviour- the role of the 'command neuron'
3. How to catch an owl: owl acoustics
4. More to spiders than meets the eye: jumping spider vision
5. Vision in toads
6. Catching dinner on the fly: bat echolocation
7. The night is alive with the sound of echoes (and scuttle of bugs): moths and cockroaches
8. Discussion or TBA
9. Shock news on fish: electroreception
10. How to catch the wind: spider mechanoreception
11. Learning and memory in *Aplysia*
12. Learning at a snail's pace

Elissa Cameron- Endocrine systems and behavior; topics:

1. Mating systems and reproductive hormones
2. Manipulative meerkats and mole-rats
3. Social bonding
4. Stress and the environment
5. Social stressors
6. Anthropogenic stressors

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