



# BIOL3110

## Evolutionary and Conservation Genetics

Session 1, In person-scheduled-weekday, North Ryde 2023

*School of Natural Sciences*

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff

Adam Stow

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Contact via email

Credit points

10

Prerequisites

130cp at 1000 level or above including BIOL2110 or BIOL206

Corequisites

Co-badged status

BIOLX3110

Unit description

Ongoing advances in molecular technology, statistics and bioinformatics have revolutionized our ability to gather and apply genetic information. This unit deals with the distribution of genetic variation among individuals, populations and species, and the relevance of such variation to evolutionary processes. Specific topics include selection and adaptive potential; mutation; inbreeding; population divergence; speciation; effective population size and extinction risk. Approaches to the study of genetic variation are explored at levels ranging from pedigree analysis to molecular genomics. Particular emphasis is placed on the importance of evolutionary genetics to the conservation, management and restoration of wild populations.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

**ULO1:** Explain why and how genetic factors have key importance in conservation biology

**ULO2:** Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations

**ULO3:** Identify and apply appropriate statistical formulae to solve questions in

conservation and evolutionary genetics

**ULO4:** Apply conservation genetic theory in order to propose management strategies for both wild and captive populations

**ULO5:** Synthesise and evaluate information on contemporary topics in conservation and evolutionary genetics

## General Assessment Information

### Requirements to Pass this Unit

To pass this unit you must:

- Attempt all assessments, and
- Achieve a total mark equal to or greater than 50% and achieve at least 50% in the final examination.

### Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7<sup>th</sup> day (including weekends). After the 7<sup>th</sup> day, a grade of '0' will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is **11:55 pm**. A 1-hour grace period will be provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for [Special Consideration](#).

## Commentary Article

Assessment Type <sup>1</sup>: Professional writing Indicative Time on Task <sup>2</sup>: 6 hours Due: **Week 3**  
Weighting: **5%**

You are required to write a short commentary article on a published paper dealing with genetic variation and conservation. This will require a short literature search to identify a relevant paper from among the leading journals in conservation genetics (incl. *Science*, *Nature*, *PNAS*, *PLOS biology*, *Evolution*, *Molecular Ecology*, *Conservation Biology*, *Conservation Genetics* + many others). You should then familiarize yourself with the paper and its methodologies and write a commentary in the style of those appearing in the 'Perspectives' section of the journal *Science*. This is an early assessment task, with assessment criteria weighted for participation and genuine effort (given the early stage of unit material delivery). You will submit this assignment via TURNITIN.

On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics
- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations
- Synthesise and evaluate information on contemporary topics in conservation and evolutionary genetics

## Seminar

Assessment Type <sup>1</sup>: Presentation Indicative Time on Task <sup>2</sup>: 8 hours Due: **Week 9**

Weighting: **15%**

You are required to give an oral presentation supported by slides using Powerpoint or similar. The topic can be based on one to several topical research paper(s) in conservation/ecological genetics. Conference presentations are a primary means of communicating knowledge in science, and these sessions will be conducted in the manner of a formal scientific conference. Time limits will be strictly enforced, and will constitute part of the assessment criteria for this task.

On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics
- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations
- Synthesise and evaluate information on contemporary topics in conservation and evolutionary genetics

## Problem Tests

Assessment Type <sup>1</sup>: Quiz/Test Indicative Time on Task <sup>2</sup>: 16 hours Due: **Week 6 and Week 9**

Weighting: **30%**

Students will submit two mathematical problem sets based tutorial work.

On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics

## Final Examination

Assessment Type <sup>1</sup>: Examination Indicative Time on Task <sup>2</sup>: 38 hours Due: **TBA** Weighting: **30%**

You will be tested on your knowledge of course content, including information from all lectures and tutorials, plus prescribed reading from the textbook (Frankham *et al.*) and other sources made available on ilearn. Check online ([www.mq.edu.au](http://www.mq.edu.au)) for scheduling updates towards the end of the teaching session.

On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics
- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations
- Synthesise and evaluate information on contemporary topics in conservation and evolutionary genetics

## Scientific Report

Assessment Type <sup>1</sup>: Report Indicative Time on Task <sup>2</sup>: 34 hours Due: **Week 11** Weighting: **20%**

You are required to prepare a scientific manuscript based on the data analysed in the computer lab tutorial. Your manuscript should be structured according to the author instructions for 'original articles' in the journal *Evolution*:

<http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291558-5646/homepage/ForAuthors.ht>

## ml

This will be submitted via TURNITIN. Further information, discussion and resources (including a marking rubric) will be provided prior to and during the computer lab tutorial.

On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics
- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations
- Synthesise and evaluate information on contemporary topics in conservation and evolutionary genetics

<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Final Examination</a>	30%	No	TBA (exam period June)
<a href="#">Problem Tests</a>	30%	No	Week 6 and Week 9
<a href="#">Commentary Article</a>	5%	Yes	Week 3; 7/3/23
<a href="#">Seminar</a>	15%	No	Week 8; 26/4/23
<a href="#">Scientific Report</a>	20%	No	Week 11; 15/5/23

### Final Examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 38 hours

Due: **TBA (exam period June)**

Weighting: **30%**

You will be tested on your knowledge of course content, including information from all lectures and tutorials, plus prescribed reading from the textbook (Frankham *et al.*) and other sources. No mathematical problem solving will be required in this examination. Check online ([www.mq.edu.au](http://www.mq.edu.au)) for scheduling updates towards the end of the teaching session.

On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
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## Problem Tests

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 16 hours

Due: **Week 6 and Week 9**

Weighting: **30%**

Students will submit two mathematical problem sets based tutorial work.

On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics

## Commentary Article

Assessment Type <sup>1</sup>: Professional writing

Indicative Time on Task <sup>2</sup>: 6 hours

Due: **Week 3; 7/3/23**

Weighting: **5%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

You are required to write a short commentary article on a published paper dealing with genetic variation and conservation. This will require a short literature search to identify a relevant paper from among the leading journals in conservation genetics (incl. *Science*, *Nature*, *PNAS*, *PLOS biology*, *Evolution*, *Molecular Ecology*, *Conservation Biology*, *Conservation Genetics* + many others). You should then familiarize yourself with the paper and its methodologies and write a commentary in the style of those appearing in the 'Perspectives' section of the journal *Science*. This is an early assessment task, with assessment criteria weighted for participation and genuine effort (given the early stage of unit material delivery). You will submit this assignment via TURNITIN.

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- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations
- Synthesise and evaluate information on contemporary topics in conservation and evolutionary genetics

## Seminar

Assessment Type <sup>1</sup>: Presentation

Indicative Time on Task <sup>2</sup>: 8 hours

Due: **Week 8; 26/4/23**

Weighting: **15%**

You are required to give an oral presentation using Powerpoint, based on one to several topical research paper(s) in conservation/ecological genetics. Conference presentations are a primary means of communicating knowledge in science, and these sessions will be conducted in the manner of a formal scientific conference. Time limits will be strictly enforced, and will constitute part of the assessment criteria for this task.



On successful completion you will be able to:

- Explain why and how genetic factors have key importance in conservation biology
- Explain the importance of genetic diversity, and identify the phenomena that influence and maintain genetic diversity in populations
- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics
- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations
- Synthesise and evaluate information on contemporary topics in conservation and evolutionary genetics

## Scientific Report

Assessment Type <sup>1</sup>: Report

Indicative Time on Task <sup>2</sup>: 34 hours

Due: **Week 11; 15/5/23**

Weighting: **20%**

You are required to prepare a scientific manuscript based on the data analysed in the computer lab tutorial. Your manuscript should be structured according to the author instructions for 'original articles' in the journal *Evolution*:

<http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291558-5646/homepage/ForAuthors.html>

This will be submitted via TURNITIN. Further information, discussion and resources (including a marking rubric) will be provided prior to and during the computer lab tutorial.

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- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations
- Synthesise and evaluate information on contemporary topics in conservation and

evolutionary genetics

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

Lectures will be given live online (via zoom) with recordings available via ECHO. Tutorials will be face-to-face and online. Resources will be made available via ilearn.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the

University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

### The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Changes since First Published

Date	Description
18/04/2023	Typo fixed for the submission date of the seminar assignment - thanks