



BIOL334

Evolutionary and Conservation Genetics

S2 External 2018

Dept of Biological Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	3
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	4
<u>Delivery and Resources</u>	7
<u>Policies and Procedures</u>	7
<u>Graduate Capabilities</u>	9
<u>Changes from Previous Offering</u>	15
<u>Changes since First Published</u>	15

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff

Unit convenor

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Tutor

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Credit points

3

Prerequisites

(39cp at 100 level or above) including BIOL206

Corequisites

Co-badged status

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:

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

General Assessment Information

Overdue assignments will attract a penalty at the rate of **5 % of the total mark allocated for the assignment per day past the due date**. This penalty will be capped at 75 %, which means that once your submission is more than 15-days overdue you can earn up to a maximum of 25 % of the assessment grade. The date and time of your submission will be taken as registered by TURNITIN.

Deadlines for assessments are **not negotiable** except under circumstances when you have experienced a serious and unavoidable disruption. In such instances, you should formally lodge a disruption to studies notification via ASK@MQ. University policy and procedure in regard to disruptions is given in the links below, but please note in particular:

1. To be eligible for special consideration, you must notify the University of a *serious and unavoidable* disruption **within five (5) working days** of the commencement of the disruption;
2. Such requests must be lodged for the **specific assessment task** for which you experienced disruption. Special consideration cannot be granted retrospectively (i.e., beyond the 5-day window of each assessment due-date);
3. Unit staff will NOT be held responsible for assessing special consideration **unless a disruption notification is formally lodged** via ASK@MQ.

Final exam

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the week of December 17-21 2018. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application.

Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Commentary article</u>	5%	No	17/08/2018
<u>Problem test #1</u>	15%	No	Week 6
<u>Problem test #2</u>	15%	No	Week 13
<u>Oral Presentation</u>	15%	No	Weeks 9-10
<u>Assignment 2</u>	20%	No	Week 12 (int) & 10 (ext)
<u>Final Examination</u>	30%	No	Exam period

Commentary article

Due: **17/08/2018**

Weighting: **5%**

Assignment 1 (5% of total unit assessment): Commentary article

You are required to write a short (500-600 word) 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*. Further information regarding this task will be provided in early lectures. This is an early assessment task, with assessment criteria weighted for participation and genuine effort (given the early stage of unit material delivery). There is a link embedded in iLearn Week 3 for you to 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;

Problem test #1

Due: **Week 6**

Weighting: **15%**

Problem test 1 (15% of total unit assessment)

In week 6 - and during the on-campus session for externals – you will be tested on material from the two problem-based tutorial sets. This test will constitute a series of multiple choice questions coupled with problems for you to solve mathematically. The problems will be modeled on those worked through in preceding tutorials. The test will be 1 hr in duration and conducted in the tutorial room under exam conditions, that is, silently and with no written material, books or mobile phones allowed at your workstation. Non-programmable calculators will be permitted.

On successful completion you will be able to:

- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics;

Problem test #2

Due: **Week 13**

Weighting: **15%**

Problem test 2 (15% of total unit assessment)

In week 13 - and during the on-campus session for externals – you will be tested on material from the two problem-based tutorial sets. This test will constitute a series of multiple choice questions coupled with problems for you to solve mathematically. The problems will be modeled on those worked through in preceding tutorials. The test will be 1 hr in duration and conducted in the tutorial room under exam conditions, that is, silently and with no written material, books or mobile phones allowed at your workstation. Non-programmable calculators will be permitted.

On successful completion you will be able to:

- Identify and apply appropriate statistical formulae to solve questions in conservation and evolutionary genetics;

Oral Presentation

Due: **Weeks 9-10**

Weighting: **15%**

Seminar (15% of total unit assessment)

In weeks 9 & 10 – and in day 2 of the residential session for external students – you are required to give a 10-min oral presentation 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. Your talk should be delivered as a Powerpoint presentation of 10-min duration, leaving ~2 min to field questions from the audience. Time limits will be strictly enforced, and will constitute part of the assessment criteria for this task. Your powerpoint presentation must also be submitted on the day of your presentation. More details and a schedule will be provided in lectures beforehand.

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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assignment 2

Due: **Week 12 (int) & 10 (ext)**

Weighting: **20%**

Assignment 2 (20% of total unit assessment): Scientific report

You are required to prepare a scientific manuscript based on the data analysed in the computer lab tutorial. Your manuscript should adhere to the author instructions for 'original articles' in the journal *Evolution*. The assignment is due ~4 weeks after you complete the computer lab tutorial. As with Assignment 1, there are links for TURNITIN submission in iLearn for internal and external students. 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:

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- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Final Examination

Due: **Exam period**

Weighting: **30%**

Final examination (30% of total unit assessment)

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. This will consist of a formal exam of 2-hr duration, held during the end-of-year examination period, and will consist of multiple choice questions plus one long-answer essay-style question. No mathematical problem solving will be required in this examination. Check online (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;
- Apply conservation genetic theory in order to propose management strategies for both wild and captive populations;

Delivery and Resources

Timetable:			
Lecture 1	Monday	14:00 – 15:00	17WW-Forum
Lecture 2	Wednesday	08:00 – 09:00	Electronic only
Tutorial [class 1]	Monday	09:00 – 11:00	06EAR-104
Tutorial [class 2]	Monday	12:00 – 14:00	06EAR-104
Tutorial [class 3]	Wednesday	09:00 – 11:00	06EAR-104
Residential session (for external students)	Sat 15 - Mon 17 September (inclusive)		11WW-260

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

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

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

Student Code of Conduct

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

Results

Results shown in *iLearn*, 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.

Student Support

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

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit 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.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assessment tasks

- Commentary article
- Oral Presentation
- Assignment 2
- Final Examination

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assessment tasks

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- Assignment 2
- Final Examination

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assessment tasks

- Commentary article

- Oral Presentation
- Assignment 2
- Final Examination

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assessment tasks

- Commentary article
- Problem test #1
- Problem test #2
- Oral Presentation
- Assignment 2
- Final Examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assessment tasks

- Commentary article
- Oral Presentation
- Assignment 2
- Final Examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assessment tasks

- Problem test #1
- Problem test #2
- Assignment 2

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- 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;
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Assessment tasks

- Commentary article
- Oral Presentation
- Assignment 2
- Final Examination

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- 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;
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Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- 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;
- Prepare presentations (both written and oral) that synthesize information on contemporary topics in conservation and evolutionary genetics;

Assessment tasks

- Commentary article

- Oral Presentation
- Assignment 2
- Final Examination

Changes from Previous Offering

Due to staffing profiles in this year the Wednesday 8:00-9:00am Lecture will be wholly delivered electronically. Lecture materials will be uploaded as usual in iLearn and the playback accessible via Echo360 recording.

Changes since First Published

Date	Description
27/07/2018	-
19/07/2018	Internal and external unit guide combined.