



# BIOL262

## Evolution

S1 Day 2014

*Dept of Biological Sciences*

### Contents

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<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	9
<u>Unit Schedule</u>	10
<u>Policies and Procedures</u>	12
<u>Graduate Capabilities</u>	13
<u>Changes since First Published</u>	18

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#### **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

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Credit points

3

Prerequisites

6cp in BBE or BIOL units at 100 level

Corequisites

Co-badged status

Unit description

This unit follows on from biology units at 100 level, and will deal coherently with the unifying theory of the biological sciences – evolution. Evolutionary biology helps us to understand the history of life on earth, and the inter-relationships between different groups of organisms. The unit will examine how evolutionary processes create biodiversity in the natural world with respect to organismal structure, physiology, and behaviour. The unit will also demonstrate how an evolutionary framework informs contemporary issues such as the emergence of pandemic disease, the human obesity crisis, and selection as a result of global climate change.

## 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:

Summarise the key characteristics of biological evolution

Differentiate between micro- and macroevolution; and natural and sexual selection

- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Assessment Tasks

Name	Weighting	Due
<a href="#">Online quizzes</a>	30%	11:59pm Friday every 2 weeks
<a href="#">Assignment 1</a>	10%	2pm Friday 28th March
<a href="#">Mid-session exam</a>	10%	11:59pm Monday 28th April
<a href="#">Assignment 2</a>	20%	2pm Friday 23rd May
<a href="#">Final Exam</a>	30%	TBA

### Online quizzes

Due: **11:59pm Friday every 2 weeks**

Weighting: **30%**

Each practical laboratory session in BIOL262 will be assessed via an online, multiple choice quiz on iLearn. The questions for each quiz will be based directly on the worksheets completed during each of the practical laboratory sessions. As such, you should not attempt any of the quizzes without having first completed the associated prac.

The prac quizzes can be accessed via the Weekly Topic Sections or the Activities Block on the main page of the BIOL262 iLearn site. Each quiz is marked out of 20 and you will have 20 minutes to answer all questions. The number of questions will vary from week to week. You may only attempt each quiz once.

On successful completion you will be able to:

- Summarise the key characteristics of biological evolution
- Differentiate between micro- and macroevolution; and natural and sexual selection
- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics

# Assignment 1

Due: **2pm Friday 28th March**

Weighting: **10%**

Assignment 1 will provide you with the opportunity to assess how evolutionary biology, and science generally, is presented in the popular media. Almost all of you will have read an article in a newspaper or on a blog about a new scientific discovery. But how often have you ever followed up on the report and delved into the peer-review literature to read the scientific paper the article was based upon. Scientific findings can sometimes be misrepresented, and this assessment will allow you to identify the accuracy of media in respect to its reporting of evolutionary science.

## Instructions

You are to identify stories in the popular media focused on evolutionary biology and assess the overall accuracy of the reporting. It is up to you to identify which articles have an evolutionary angle and which articles are focused on 'general biology'. **I will not respond to anyone asking me to tell them whether an article is suitable.** Part of the assignment is your ability to identify evolutionary concepts.

An archive of relevant news articles has been compiled on iLearn. These are available in the Assessment section. You are to select **one** of these articles to report on. You must also find **two additional articles of your own**. PLEASE DO NOT SHARE ARTICLES (the point is to find your own). These articles should come from the 'less sophisticated' end of the news market (i.e. tabloids). **DO NOT USE** stories from CNN, BBC, ABC Online, Nature.com, ScienceNOW, New Scientist or similar. Articles from these sources will not be assessed.

For each article you will need to track down the peer-reviewed publication that is the focus of the news report. This will require some detective work on your part. Even in nearly all of the most dummed-down articles they will mention either the name of the scientist, the university the work was done at, or perhaps the journal it was published in. That information should enable you to track down the original paper. It is possible that some media stories are not focused on work that is actually published in peer-reviewed literature. In that case you will have to find an alternate story.

You must produce a written report on each of your articles. Start each report on a new page. Your assignment must be word processed using a 12 pt font with **double spacing** throughout. Hand written assignments won't be accepted. Structure each report using the numbered sections listed below:

1. Give the title of the news article
2. For each news article, insert a pdf or jpg of the article into your report.
3. Give the full citation of the scientific article that the story is based upon. **You must use the Harvard Referencing style for this citation.** See the separate handout on the Harvard Referencing Style on the iLearn page.
4. Ensuring that you **do not copy** the abstract of the article, write a 200 word description of the contents of the scientific paper and their main conclusion.

5. Write a 50 word description of the concept from evolutionary biology that the scientific article is focused on.
6. In 200 words, list any factual errors in the news article (point form is fine)
7. Rate both the accuracy of the news story and the quality and importance of the scientific paper, **both out of 10**.

## Marking Criteria

Total mark out of 60 (20 marks per article).

Identification and evaluation of the significance of the peer reviewed publication, the evolutionary concepts discussed and any factual errors in the news article. **(12 marks)**

Logical organisation, formatting, sentence structure and style/grammar/spelling. Submissions must be in your own words. **Note that the word limits are non-negotiable** (+10% is not acceptable). Failure to adhere to the guidelines will be penalised harshly. You have been warned. **(6 marks)**,

Correct citation of sources using the Harvard Referencing **(2 marks)**

## Submission Details

A printed copy of your assignment must be submitted to the Science Centre by 2pm Friday 28<sup>th</sup> March. **It must also include a signed Faculty of Science cover sheet** ([http://web.science.mq.edu.au/new\\_and\\_current\\_students/undergrad/assignments\\_and\\_coversheets/](http://web.science.mq.edu.au/new_and_current_students/undergrad/assignments_and_coversheets/)). As part of the submission requirements for Assignment 1, all BIOL262 students must also submit their work to *Turnitin*, an anti-plagiarism detection tool. The link to *Turnitin* can be found in the Assessment Topic Section on the main page of the BIOL261 iLearn site. Students who do not submit their work to *Turnitin* will not have their work marked until they do so. **Please do not submit your assignment cover sheet with your assignment to Turnitin.**

On successful completion you will be able to:

- Summarise the key characteristics of biological evolution
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Mid-session exam

Due: **11:59pm Monday 28th April**

Weighting: **10%**

The mid-session exam will cover material from **all lectures and practical laboratory sessions in weeks 1-6**. This exam will be conducted as an open-book online multiple-choice quiz accessed through iLearn,

## Instructions

The mid-session exam can be accessed via the Assessment sections on the main page of the BIOL262 iLearn site. The exam is marked out of 100 and you will have 1 hour to answer all questions. You will get one opportunity to answer each question and one opportunity to undertake the exam.

## Submission Details

The exam will be available for a limited period on Monday the 28<sup>th</sup> of April (10am – 11.59pm). It can be conducted in your own time, but once started will remain open for only 1 hour. Any questions not completed after this time will be marked as incorrect. The exam will not be reopened at a later date and computer or internet issues will not be acceptable grounds to resit the exam. It is up to you to ensure you have a suitable internet connection prior to commencing the exam (if in doubt, it is suggested you utilise the university network to complete the exam).

On successful completion you will be able to:

- Summarise the key characteristics of biological evolution
- Differentiate between micro- and macroevolution; and natural and sexual selection
- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics

## Assignment 2

Due: **2pm Friday 23rd May**

Weighting: **20%**

Assignment 2 (the Major Assignment) will provide you with a further opportunity to become familiar with the way scientific ideas are communicated by reading a series of primary scientific papers on a hotly debated topic in evolutionary biology. You are required to formulate your own ideas and conclusions regarding the strengths and weaknesses of the data presented in published papers.

## Instructions

Each student enrolled in BIOL262 is expected to choose and submit **ONE** Major Assignment from the topics provided. The topics for this year, as well as the questions you need to address can be found on the iLearn page in the Assessment section.

Your assignment should be word processed using a 12 pt font with **double spacing** throughout, and **should not exceed 1500 words** (this is approximately equivalent to 4-5 double spaced A4 pages for text in 12 pt font and 2.5 cm margins). Hand written assignments will not be accepted.

Make sure you carefully read both questions and all the associated core papers for your chosen topic. **Your assignment must precisely and completely address the questions posed.**

An accurate **word count** should be included at the end of the assignment (after the references). **Note that the word limit is non-negotiable** (+10% is not acceptable). Failure to adhere to the guidelines will be penalised harshly. You have been warned.

You **MUST** include figures, graphs and/or tables in your assignment. Figures are vital as supporting evidence for your arguments and point of view. Make sure all figures, graphs, tables etc are referred to in the text and are included at relevant places in the text – do not lump them all together at the end of the assignment. **The word limit does not include supporting figures, graphs or tables.**

A set of core papers for the assignment topics are available on iLearn (under the Assessment section). It is always a good idea to carefully read each of the core papers several times so that you can come to grips with the main thrust(s) each one presents. The core papers are meant to provide a starting point for your reading, but are not intended to be comprehensive. You are expected to access other relevant primary scientific literature sources **outside** of the core papers (at least 10-15+ publications).

**Use only primary reference sources from scientific texts and journals.** Avoid using secondary (and usually dated) sources such as encyclopedias or Readers Digest type material. **Don't use Wikipedia** (an online reference encyclopedia) as a reference source. Although this site has improved in recent years, it still has plenty of factual errors. Since Wikipedia merely summarises conclusions and does not present evidence, it is a classic example of a secondary source.

**Primary source** = a paper published in a peer reviewed, international scientific journal that presents raw scientific data collected in the field or the lab, interpretation of results and conclusions. Primary sources are written by the scientists who undertake the original investigation/experimentation. There are lots of primary sources (especially scientific journals) in the Library and you can search through topics using keyword searches in bibliographic databases on the Library website.

**Secondary source** = a review or compilation of the research performed by someone other than the author. Examples of secondary sources include textbooks, popular science magazines (e.g. *New Scientist*), newspapers, Readers Digest and most web sites (e.g. Wikipedia). While some secondary sources can provide accurate information, they often only present the conclusions and not the raw data or evidence that the conclusions are based on. The reader therefore has no way of checking the data to see if alternative interpretations or conclusions can be reached. Secondary sources can also include material that is out of date, misinterpreted, or simply wrong.

To successfully complete this task you will need to rigorously assess and evaluate the data/evidence presented in each paper and to frame your answer to the questions posed based on supporting evidence and data from the literature. Keep in mind that I want **YOUR** critical evaluation/synthesis of the topic, not someone else's. Don't fall into the trap of simply summarising the conclusions or interpretations of the authors of the core papers. Your job is to critically evaluate the **evidence** provided in support of the various interpretations. With only 1500 words you will need to be concise and to the point. **Students who provide only a summary/overview of the topic will be receive a poor mark.** See the handout on Summary vs. Synthesis on the iLearn page for more information.



Make sure all the information sources you use are cited in the text in the appropriate manner. A full reference list in alphabetical order should be included at the end of your assignment. Only sources cited in the main text of your assignment should be included in the reference list. **You MUST use the Harvard Referencing Style when writing your assignment** (see the separate handout on the Harvard Referencing Style available on iLearn). This means that the use of footnotes or numbered reference citations (Oxford referencing style) **should be completely avoided. The reference list is not included in the word limit.**

Direct copying from the work of others (including other students) is **plagiarism. Your assignment must be entirely in your own words and represent your own ideas and conclusions.** Failure to adhere to this requirement will result in a loss of marks. In extreme cases, the University has a very strict policy relating to plagiarism which may involve failure in the unit.

## Marking Criteria

The Major Assignment will be marked out of 100. Marks for the Major Assignment will be given for:

1. Precise and complete answering of the posed questions through a detailed scientific evaluation and synthesis of relevant evidence/data from the primary scientific literature. **(60 marks)**
2. Readability, logical organisation, formatting, sentence structure, style, grammar and spelling. **(20 marks)**
3. Relevance, clarity and acknowledgement of all figures, graphs and tables. Figures **MUST** be used to support your views in the Major Assignment. **(10 marks)**
4. Complete reference list and the correct and comprehensive citation of all sources using the Harvard Referencing System. **(10 marks)**

## Submission details

A printed copy of your assignment must be submitted to the Science Centre by 2pm Friday 23<sup>rd</sup> May. **It must also include a signed Faculty of Science cover sheet** ([http://web.science.mq.edu.au/new\\_and\\_current\\_students/undergrad/assignments\\_and\\_coversheets/](http://web.science.mq.edu.au/new_and_current_students/undergrad/assignments_and_coversheets/)). As part of the submission requirements for Assignment 2, all BIOL262 students must also submit their work to *Turnitin*, an anti-plagiarism detection tool. The link to *Turnitin* can be found in the Assessment Topic Section on the main page of the BIOL261 iLearn site. Students who do not submit their work to *Turnitin* will not have their work marked until they do so. **Please do not submit your assignment cover sheet with your assignment to Turnitin.**

On successful completion you will be able to:

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- Differentiate between micro- and macroevolution; and natural and sexual selection
- Evaluate the differing evidence for evolution provided by the fossil record; experimental



biology; field biology; and genomics

- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Final Exam

Due: **TBA**

Weighting: **30%**

The final exam will cover material from **all lectures and practical laboratory sessions** (weeks 1-13).

The final exam will be completed as part of the formal examination period at the end of the semester. The exam is marked out of 100 and you will have 3 hours to answer all questions.

On successful completion you will be able to:

- Summarise the key characteristics of biological evolution
- Differentiate between micro- and macroevolution; and natural and sexual selection
- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Delivery and Resources

### Lectures

BIOL262 has two lectures per week that are held on:

**Thursday at 10.00 - 12.00 pm in E7B T3 and**

**Friday at 2.00 - 3.00 pm in W5A T1.**

The lectures will focus on a broad range of evolutionary concepts and topics. See the Unit Schedule for topics to be covered each week. Lectures will be available via Echo360 for all students, however, it is in the best interests of internal students to attend the lectures in person each week. It has been my observation that internal students who regularly attend lectures tend to perform better than those who only occasionally attend lectures. Lecture slides will be available from Echo360 and the BIOL262 iLearn site.

### Practicals

Practical laboratory sessions for students enrolled in BIOL262 will be held every second week starting from Week 2. Days and times are as follows:

**Monday at 10:00 -1:00 pm**

### Monday at 2:00 pm – 5:00 pm

Classes are held in F7B 102 and F7B 105. All students MUST attend one of these classes. Each practical laboratory session will provide students with the opportunity to come into contact with a range of organisms that will reinforce the terminology and concepts outlined in the lectures. See the Unit Schedule for topics to be covered in each practical. The practical laboratory sessions have been designed so that you should be able to complete all necessary data collection during the class. Introductory slides for each practical laboratory session will be available on the BIOL262 iLearn site, as will worksheets to be completed during each practical laboratory session. **All students are required to bring a copy of the prac worksheets with them each week.** Copies of the worksheet will not be provided. These worksheets contain specific tasks that need to be completed and relevant background information that will assist in completing each practical laboratory session.

### Workshops

Workshop sessions for students enrolled in BIOL262 will be held every second week starting from Week 3. Days and times are as follows:

#### Monday at 10:00 -12:00 pm

#### Monday at 2:00 pm – 4:00 pm

Classes are held in F7B 102 and F7B 105. All students MUST attend one of these classes. Each workshop session will be a direct continuation of the previous week's practical class, providing the additional time and resources needed to undertake data analysis and complete outstanding tasks. The sessions may also include additional tasks either associated with or independent of the previous week's practical. **No data collection will be possible during these sessions.** Because these sessions will often be directly linked to the previous practical, **make sure you bring along the data you collected in the previous practical class.** You will also need the associated worksheet.

## Unit Schedule

We will attempt to follow this outline throughout the semester. Any changes will be posted on the iLearn page.

### Lectures

	DATE	TOPIC
1	6-Mar	Introduction/ What is Evolution
2	7-Mar	History of Evolutionary Biology
3	13-Mar	Species
4	14-Mar	Speciation

5	20-Mar	Origin of Genetic Diversity
6	21-Mar	Variation
7	27-Mar	Genetic Drift
8	28-Mar	Phenotypic Evolution
9	3-Apr	The Genetic Theory of Natural Selection
10	4-Apr	Natural Selection and Adaptation
11	10-Apr	The Evolution of Life Histories
12	11-Apr	Evolution and Development
14	1-May	The Tree of Life: Classification and Phylogeny
15	2-May	Patterns of Evolution
16	8-May	A History of Life on Earth
17	9-May	Evolution in the Fossil Record
18	15-May	The Evolution of Biodiversity
19	16-May	Macroevolution: Evolution above the Species Level
20	22-May	The Geography of Evolution
21	23-May	Sex and Reproductive Success
22	29-May	Conflict and Cooperation
23	30-May	Coevolution: Evolving Interactions among Species
24	5-Jun	Evolutionary Science, Creationism and Society
25	6-Jun	Evolutionary Science, Creationism and Society
26	12-Jun	Summary and Wrap-up
27	13-Jun	Summary and Wrap-up

## Practicals

Year Week	Session week	DATE	ACTIVITY
8	1	3-Mar	No Practical or Workshop
9	2	10-Mar	Prac 1: Evolution: one brick at a time
10	3	17-Mar	Workshop 1
11	4	24-Mar	Prac 2: Variation
12	5	31-Mar	Workshop 2
13	6	7-Apr	Prac 3: Evolution of Bill morphology
16	7	28-Apr	No Practical or Workshop - Mid Session Exam
17	8	5-May	Prac 4: Adaptive Variation and Phenotypic Plasticity
18	9	12-May	Workshop 4
19	10	19-May	Prac 5: Phylogeny
20	11	26-May	Workshop 5
21	12	2-Jun	Prac 6: Evolution of Behaviour, Natural and Sexual Selection
22	13	9-Jun	PUBLIC HOLIDAY

## Policies and Procedures

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

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## 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](http://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](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

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

## Graduate Capabilities

### 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

- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

### Assessment tasks

- Online quizzes
- Assignment 1
- Assignment 2

## 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

- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

### Assessment tasks

- Online quizzes
- Assignment 1
- Assignment 2

## 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

- Summarise the key characteristics of biological evolution
- Differentiate between micro- and macroevolution; and natural and sexual selection
- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Assessment tasks

- Online quizzes
- Assignment 1
- Mid-session exam
- Assignment 2
- Final Exam

## 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

- Summarise the key characteristics of biological evolution
- Differentiate between micro- and macroevolution; and natural and sexual selection
- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature



## Assessment tasks

- Online quizzes
- Assignment 1
- Mid-session exam
- Assignment 2
- Final Exam

## 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

- Summarise the key characteristics of biological evolution
- Differentiate between micro- and macroevolution; and natural and sexual selection
- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Assessment tasks

- Online quizzes
- Assignment 1
- Mid-session exam
- Assignment 2
- Final Exam

## 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

- Differentiate between micro- and macroevolution; and natural and sexual selection
- Interpret a cladogram to infer phylogenetic relationships between organisms
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Assessment tasks

- Online quizzes
- Assignment 1
- Assignment 2
- Final Exam

## 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

- Interpret a cladogram to infer phylogenetic relationships between organisms
- Identify and distinguish the different concepts of species
- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

## Assessment tasks

- Online quizzes
- Assignment 1
- Mid-session exam
- Assignment 2
- Final Exam

## 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

- Evaluate the differing evidence for evolution provided by the fossil record; experimental biology; field biology; and genomics
- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

### Assessment tasks

- Assignment 1
- Assignment 2

## 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 outcome

- Construct a oral or written argument for the importance of evolution in addressing contemporary global issues supported by the scientific literature

### Assessment task

- Assignment 1

## Changes since First Published

Date	Description
14/01/2014	The Prerequisites was updated.