BIOL228

Diversity of Life

S1 External 2019

Dept of Biological Sciences

Contents

General Information

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Credit points
3

Prerequisites
(12cp at 100 level or above) including (BIOL114 and BIOL116)

Corequisites

Co-badged status
BIOL605 Organismal Biology

Unit description
This unit explores the biological diversity of plants and animals. Relationships between structure and function are emphasised. The unit also discusses how organisms have adapted to specific environments. There is a strong emphasis on evolutionary processes and how these have generated biological diversity. A comparative approach is taken, with adaptation discussed in the context of evolutionary trees and the fossil record. The unit is suitable for students interested in organismal biology, science education, and research.

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:

1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
2. Give examples of individual organisms that belong to the major animal and plant groups
3. Identify the key anatomical traits used to define major groups
4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments
5. Present phylogenetic information in the format of slide show
6. Critically evaluate primary scientific literature in the format of an essay
7. Analyse experimental findings in the format of a scientific report

General Assessment Information

Weekly Assessment (25%)

Your progress will be tracked on a weekly basis by means of a 20-question online quiz. Content from the discussions and textbook will be covered. To accommodate externals, quizzes will only reference material in the practicals during the second half of the term (after the break). Because the unit is rich on information, if you do not study on a regular basis your grades will be impacted.

The slides for each discussion in this unit are based on primary scientific literature. You will be expected to learn fundamental concepts in organismal biology such as the intellectual basis of phylogenetics and taxonomy, the causes and consequences of adaptive radiations and mass extinctions, and the functional roles of anatomical structures. You will also learn a considerable amount of specific detail concerning the names, relationships, evolutionary histories, and key anatomical adaptations of major taxonomic groups such as phyla, classes, and orders.

Practical work constitutes a large proportion of the unit, and the weekly prac sessions are intended to lead on from the group discussion (although some pracs relate to material covered the next week). All prac sessions will be up to 3 hours in duration. The prac sessions for *internals* will held in E8A 120 on Wednesdays and Thursdays. The prac sessions for *externals* will be held in E8A 120 on 9 and 10 March and on 26, 27, and 28 April. Students are expected to attend every single prac, and you must attend at least six pracs to pass the unit. If you attend fewer, you will automatically be failed.

Note that there are no internal pracs during weeks 1, 7, 12, and 13.

Phylogenetic Illustration (5%)

Creating your own Phylogenetic Illustration will help you to become more familiar with interpreting phylogenies (= evolutionary trees), which are presented many times in the Discussion PDFs and must be understood to profit from this unit. An Illustration consists of a slide show prepared in PowerPoint and saved as a PDF (do not submit the original PowerPoint file!). It includes a phylogeny taken from the literature and at least 15 images drawn from at least 10 websites that illustrate the species included in the phylogeny. The phylogeny must pertain to a taxonomic group (usually a particular family) that comes from a list provide to you in the detailed instructions.

A Turnitin link for the assignment will be made available on iLearn early during the semester. Hard copies may not be submitted. An announcement will be made once the detailed instructions have been released, including the list of papers to be analysed.

Marks will be allotted for accuracy of the title and reference slides (10%); correct and clear presentation of the phylogeny (10%); choice of a phylogeny relevant to the instructions that includes at least 15 particular species (10%); quality and relevance of the species images (60%); and accuracy, formatting, and relevance of the 10 or more distinct URLs (10%).

Literature Review (20%)

The 1500 word Literature Review will provide an opportunity to read and evaluate recently published scientific papers that will be assigned to you. You will have to first summarise them and then discuss their strengths and weaknesses in a short and succinct manner. This task will allow you to become familiar with the primary way scientists communicate their ideas.

The Turnitin link will be made available several weeks before the assignment is due, and

finalised instructions will be placed on the iLearn site. Microsoft Word versions are required: PDFs and hard copies may not be submitted.

The assignment will begin by presenting a 225 to 275 word abstract of each paper. Each abstract should be preceded by a full reference to the paper, giving all the authors, the publication year, paper title, journal title, volume number, and page numbers. The structure of each abstract should follow the guidelines used by *Nature* magazine, which can be viewed on the iLearn site. The only differences are that you must stick to the 225 to 275 word limit and you must refer to "the authors" and "they" instead of "we".

After the abstracts you will present a 500 word analysis of all the papers together, identifying common themes, explaining conflicts, and weighing the pros and cons of the different data sets, methods, results, and interpretations. Finally, you will conclude with a statement of your own view of the facts and provide directions for future research. Brief subheadings should be provided throughout the assignment.

The abstracts and everything else in the assignment must be entirely in your own words. Any copied words, no matter how few, must be placed in quotation marks. If you copy anything without attribution or without using quotation marks you will not receive credit for the relevant parts of the assignment. If you have copied without attribution, then depending on the severity of the case you may be reported to the Faculty Student Administration Manager, in accord with the Academic Integrity Policy (see the *Policies and Procedures* section).

You may want to consult the short, simple volume by W. Strunk and E.B. White called *The Elements of Style*.

Marks will be allotted for the following:

• Quality of the abstracts (20%): Organisation and coherence of the text, and factual correctness. You must use your own words.

• Scientific evaluation (30%): Organisation of the text, lack of repetition, persuasive answering of questions posed in the instructions, and presentation of a soundly argued personal opinion. You must present your own arguments in your own words and they must be grounded in the references.

• Adherence to the overall 1500 word limit (10%): Marks will be deducted for going either under or over the limit by 10%.

• Presentation (30%): Spelling, grammar, conciseness, and sensible use of subheadings. Use 12 point font and double space the text.

• References (10%): Matching of citations to the text and the formatting and completeness of the references. You must use the Harvard Referencing Style. Numbering of references in the text and use of footnotes is not allowed.

Practical Report (15%)

The 1000 word Practical Report will be based on data collected during the Skull Allometry exercise during Week 11 (internals) or the second On Campus Session (externals). The report will be due at the end of Week 13. It will be in the format of a real-world scientific research

journal article, except that references are not required.

As with the other assessments, further details will be announced via iLearn during the semester and a Turnitin link will be provided. Again, provide the document in MS Word format, not as a PDF or in a hard copy.

Marks will be allotted for scientific evaluation (50%), adherence to the word limit (10%), and presentation (30%), as discussed in the preceding section. The scientific evaluation marks will consider whether you included enough details regarding data collection and data analysis procedures to allow replicating your analysis. The presentation marks will additionally assess the use of proper, standardised subheadings (Introduction, Data, Methods, Results, Discussion, References). An abstract should not be included.

The assignment must also include a graph showing a scatter plot with a fitted regression line, accompanied by an accurate and informative caption (10%).

Final Examination (35%)

The Final Examination will cover all the major concepts introduced in the unit. It will include multiple choice questions, short answer questions, and essays. Details will be given in the unit's final discussion. Please consult the official Macquarie website for details on receiving special consideration for the final in order to sit a supplementary exam.

Assessment Tasks

Name	Weighting	Hurdle	Due
Weekly Assessment	25%	No	Weekly
Phylogenetic Illustration	5%	No	15/03/19
Literature Review	20%	No	13/04/19
Practical Report	15%	No	08/06/19
Final Examination	35%	No	Exam period

Weekly Assessment

Due: **Weekly**
Weighting: **25%**

20 question quizzes

On successful completion you will be able to:

- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 2. Give examples of individual organisms that belong to the major animal and plant

groups
- 3. Identify the key anatomical traits used to define major groups
- 4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments

Phylogenetic Illustration

Due: **15/03/19**
Weighting: **5%**

slide show including a phylogeny and images of species

On successful completion you will be able to:
- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 2. Give examples of individual organisms that belong to the major animal and plant groups
- 5. Present phylogenetic information in the format of slide show

Literature Review

Due: **13/04/19**
Weighting: **20%**

1500 word assignment

On successful completion you will be able to:
- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 2. Give examples of individual organisms that belong to the major animal and plant groups
- 3. Identify the key anatomical traits used to define major groups
- 4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments
- 6. Critically evaluate primary scientific literature in the format of an essay

Practical Report

Due: **08/06/19**
Weighting: **15%**

1000 word report

On successful completion you will be able to:

- 2. Give examples of individual organisms that belong to the major animal and plant groups
- 7. Analyse experimental findings in the format of a scientific report

Final Examination

Due: **Exam period**
Weighting: **35%**

heavily based on Discussions

On successful completion you will be able to:

- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 2. Give examples of individual organisms that belong to the major animal and plant groups
- 3. Identify the key anatomical traits used to define major groups
- 4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments

Delivery and Resources

Introduction

Welcome to BIOL228 Diversity of Life, a 3 CP unit that explores the diversity of life on Earth. This unit will probe the form and function, classification, and phylogeny of key plant and animal groups.

Prerequisites for this unit are 12 cp at 100 level or above including BIOL114 and BIOL116.

Unit description

This unit explores the biological diversity of plants and animals. There is a strong emphasis on evolutionary relationships, the fossil record, and key anatomical structures. The unit is suitable for students interested in organismal biology, science education, and research.

Unit delivery and attendance requirements

Workload

Since BIOL228 is a 3 cp unit, you are expected to spend about 9 hours per week (including face-to-face teaching time) working on this unit for the duration of the semester. Please note that Macquarie University defines a semester as being 15 weeks in duration: 13 weeks of face-to-face teaching plus the two week mid-semester break.

Discussions

There will be two one-hour Discussions of the learning materials each week. They will be structured as combined lectures and tutorials, and will focus on the PDFs to be found on the iLearn site. Each week, the first Discussion will be held on Monday at 12:00 in 9 Wallys Walk 102 Theatrette. The second will be held every Tuesday at 3:00 PM in the same room. The Discussions will be recorded live and posted on Echo360 (accessed via the BIOL228 iLearn site). External students are invited to attend the Discussions in person if they wish.

The weekly quizzes will focus on the same PDF material. In other words, many of the questions are based on material only presented and explained in the Discussions. Therefore, if you do not attend or view them you may receive poor grades on the quizzes.

See the Unit Schedule for the topics to be covered each week. For the following reasons, it is in your best interests to attend:

• Conversations are easier to understand if you can see the instructor.

• Attending gives you an opportunity to ask questions.

• You need to prepare every week anyway because of the quizzes, and you might as well not put it off.

• Students who attend Discussions regularly tend to perform better than students who attend them infrequently.

• Lecturers very much appreciate interacting with you personally.

Weekly practical laboratory sessions

Each *internal* student is expected to attend one three-hour prac session during each of nine weeks. Sessions will be held in 14 Eastern Road – 120 Science Lab, and they will run from 10:00 AM to 1:00 PM and from 2:00 PM to 5:00 PM on Wednesday and Thursday. You must attend at least six pracs to pass the unit.

Each *external* student is expected to attend the two on-campus sessions, which cover the same nine pracs. The first is on 9 and 10 March (a Saturday and Sunday) and will be in 14 Eastern Road – 120 Science Lab. The second is on 26, 27, and 28 April (a Friday, Saturday, and Sunday) and will be in 14 Eastern Road – 160 Science Lab. Sessions will run from 9:00 AM to 5:00 PM. Externals also must attend at least six of the nine pracs to pass the unit.

iLearn

PDFs and recordings of the Discussions will be available on iLearn (https://ilearn.mq.edu.au), which is the primary method of communication for this unit. The site is also used for making announcements, answering questions, and uploading assignments via Turnitin links.

Materials

It is recommended that you maintain a notebook or bring a laptop to document your work during the practical sessions. A dissecting kit is not required.

Occupational health and safety

Due to OH&S regulations, all students must wear fully enclosed footwear (i.e. no thongs) at all

times during practical laboratory sessions. Students without proper footwear will not be allowed to enter the lab. Food and drink may not be consumed in the lab at any time either.

Recommended reading

The material presented here is more current, detailed, and directly tied to primary scientific literature than what you would find in any undergraduate textbook. Therefore, you do not need to purchase one. Instead, you are encouraged to consult primary literature referenced in the PDFs that accompany the Discussions.

Unit Schedule

Discussion schedule

1	25 February	Introduction
2	26 February	The History of Life
3	4 March	Evolution of Ecosystems
4	5 March	Biodiversity and Extinction
5	11 March	Microbes
6	12 March	Land Plants
7	18 March	Flowering Plants
8	19 March	Major Plant Families
9	25 March	Plant Diversity
10	26 March	Evolution of the Australian Flora
11	1 April	Plant Reproductive Ecology
12	2 April	Plant Diversification and Speciation
13	8 April	Plant Traits and Ecological Strategies
14	9 April	Porifera and Cnidaria
	13 April – 28 April	RECESS
15	29 April	Minor Protostomes
16	30 April	Lophophorates and Molluscs
17	6 May	Marine Arthropods
18	7 May	Terrestrial Arthropods
19	13 May	Minor Deuterostomes
20	14 May	Fishes
21	20 May	Primitive Tetrapods

22	21 May	Reptiles Part 1
23	27 May	Reptiles Part 2
24	28 May	Mammals
25	3 June	Human Evolution
26	4 June	Unit Summary

Internal practical schedule

Practical	Dates	Topic
1	6 and 7 March	The History of Life
2	13 and 14 March	Leaf Morphology
3	20 and 21 March	Plant Floral Allometry
4	27 and 28 March	Bioinformatics and Conservation
5	3 and 4 April	Invertebrate Body Plans
6	1 and 2 May	Arthropod Diversity
7	8 and 9 May	Butterflies
8	15 and 16 May	Birds
9	22 and 23 May	Skull Allometry

External practical schedule

Practical	Dates	Topic
1	9 March	The History of Life
2	9 March	Leaf Morphology
3	10 March	Plant Floral Allometry
4	10 March	Bioinformatics and Conservation
5	26 April	Invertebrate Body Plans
6	26 April	Arthropod Diversity
7	27 April	Butterflies
8	27 April	Birds

9	28 April	Skull Allometry

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). 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). 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 (https://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 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 or if you are a Global MBA student contact globalmba.support@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

If you are a Global MBA student contact globalmba.support@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

- 5. Present phylogenetic information in the format of slide show
- 6. Critically evaluate primary scientific literature in the format of an essay

Assessment task

- Phylogenetic Illustration

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

- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments
- 5. Present phylogenetic information in the format of slide show
- 6. Critically evaluate primary scientific literature in the format of an essay
- 7. Analyse experimental findings in the format of a scientific report

Assessment tasks

- Weekly Assessment
- Phylogenetic Illustration
- Literature Review
- Practical Report
- 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

- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 2. Give examples of individual organisms that belong to the major animal and plant groups
- 3. Identify the key anatomical traits used to define major groups
- 4. Explain how these traits are linked to the success of different organisms in solving

problems posed by diverse environments
- 5. Present phylogenetic information in the format of slide show
- 6. Critically evaluate primary scientific literature in the format of an essay
- 7. Analyse experimental findings in the format of a scientific report

Assessment tasks

- Weekly Assessment
- Phylogenetic Illustration
- Literature Review
- Practical Report
- 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

- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 3. Identify the key anatomical traits used to define major groups
- 4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments
- 5. Present phylogenetic information in the format of slide show
- 6. Critically evaluate primary scientific literature in the format of an essay
- 7. Analyse experimental findings in the format of a scientific report

Assessment tasks

- Weekly Assessment
- Phylogenetic Illustration
- Literature Review
- Practical Report
- 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

- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 2. Give examples of individual organisms that belong to the major animal and plant groups
- 3. Identify the key anatomical traits used to define major groups
- 4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments
- 5. Present phylogenetic information in the format of slide show
- 6. Critically evaluate primary scientific literature in the format of an essay
- 7. Analyse experimental findings in the format of a scientific report

Assessment tasks

- Weekly Assessment
- Phylogenetic Illustration
- Literature Review
- Practical Report
- Final Examination

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

- 5. Present phylogenetic information in the format of slide show
- 6. Critically evaluate primary scientific literature in the format of an essay

- 7. Analyse experimental findings in the format of a scientific report

Assessment tasks

- Weekly Assessment
- Phylogenetic Illustration
- Literature Review
- Practical Report
- Final Examination

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

- 1. Interpret phylogenetic trees and describe evolutionary relationships amongst groups of organisms
- 2. Give examples of individual organisms that belong to the major animal and plant groups
- 4. Explain how these traits are linked to the success of different organisms in solving problems posed by diverse environments
- 5. Present phylogenetic information in the format of slide show
- 6. Critically evaluate primary scientific literature in the format of an essay
- 7. Analyse experimental findings in the format of a scientific report

Assessment tasks

- Phylogenetic Illustration
- Literature Review
- Practical Report
- Final Examination