



BIOL227

Ecology

S2 External 2015

Dept of Biological Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor

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E8C209

by appointment

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Credit points

3

Prerequisites

[6cp(P) from (BIOL114 or BIOL115 or BIOL121)] or [(BIOL114(P) or BIOL115(P) or BIOL121(P)) and (ENVE117 or GEOS117) and (STAT170(P) or STAT171(P))]

Corequisites

Co-badged status

Unit description

Ecology is the study of the distribution and abundance of organisms and of the processes that generate these patterns. This unit covers basic ecological concepts at the level of organisms, populations, communities, and ecosystems. We study how interactions among organisms – and between organisms and their physical environment – shape the natural world. This unit also addresses how ecological concepts can be applied to current issues such as climate change, conservation, fisheries and agriculture. There is a compulsory field trip to Smiths Lake in the September vacation.

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 how organisms interact with each other and their environment

Analyse how biological interactions influence patterns of distribution and abundance

Analyse the structure of and changes in populations, communities, and ecosystems

Apply ecological concepts to novel situations, especially to contemporary issues

Identify appropriate scientific journal articles, and critically evaluate and synthesise key concept and conclusions.

Identify and synthesise important ecological principles.

Develop questions and pose hypotheses about ecological patterns and processes

Collect and analyse ecological data in order to evaluate hypotheses

Assessment Tasks

Name	Weighting	Due
Weekly quizzes	20%	weekly
Oral Presentation	10%	Int: Wk 5/6; Ext: campus w/end
Practical Report	15%	11 SEPT
Field trip graphing exercises	5%	Submit during fieldtrip
Smiths Lake Report	20%	16 OCT
Final exam	30%	S2 exam period

Weekly quizzes

Due: **weekly**

Weighting: **20%**

Throughout the semester you will do 10 online quizzes (each worth 2%). Quizzes will be made available on Wednesday afternoons until the following Tuesday. Quizzes will be based on lectures and recommended readings and will contain some numerical exercises.

On successful completion you will be able to:

- Analyse the structure of and changes in populations, communities, and ecosystems
- Apply ecological concepts to novel situations, especially to contemporary issues

Oral Presentation

Due: **Int: Wk 5/6; Ext: campus w/end**

Weighting: **10%**

You will select (from a list of ~25) an ecological research paper to critique. The critique will draw upon your understanding of experimental design, logic and ecological principles. You will communicate your critique to your prac group through a 10 min oral presentation, using PowerPoint as a visual aid.

On successful completion you will be able to:

- Identify appropriate scientific journal articles, and critically evaluate and synthesise key concept and conclusions.
- Identify and synthesise important ecological principles.

Practical Report

Due: **11 SEPT**

Weighting: **15%**

You will make observations and develop hypotheses about ecological patterns in the Macquarie University Ecology Reserve. In a small group, you will come up with a sampling design to test some of these hypotheses, and you will collect and analyse data. Individually, you will write up your study following guidelines for the journal *Austral Ecology*.

On successful completion you will be able to:

- Explain how organisms interact with each other and their environment
- Analyse how biological interactions influence patterns of distribution and abundance
- Analyse the structure of and changes in populations, communities, and ecosystems
- Apply ecological concepts to novel situations, especially to contemporary issues
- Identify appropriate scientific journal articles, and critically evaluate and synthesise key

concept and conclusions.

- Develop questions and pose hypotheses about ecological patterns and processes
- Collect and analyse ecological data in order to evaluate hypotheses

Field trip graphing exercises

Due: **Submit during fieldtrip**

Weighting: **5%**

In your field trip group you will decide how to present data from each of five Smiths Lake sampling exercises. Individually, you will draw an appropriate graph for each data set.

On successful completion you will be able to:

- Collect and analyse ecological data in order to evaluate hypotheses

Smiths Lake Report

Due: **16 OCT**

Weighting: **20%**

In a small group you will design and execute sampling to compare the distribution, abundance and diversity of organisms between habitats. Individually, you will write up your study following guidelines for the journal *Austral Ecology*. Production of the field trip report will build on the written communication skills you have already begun to develop through preparation of the first Practical Report.

On successful completion you will be able to:

- Explain how organisms interact with each other and their environment
- Analyse how biological interactions influence patterns of distribution and abundance
- Analyse the structure of and changes in populations, communities, and ecosystems
- Apply ecological concepts to novel situations, especially to contemporary issues
- Identify appropriate scientific journal articles, and critically evaluate and synthesise key concept and conclusions.
- Develop questions and pose hypotheses about ecological patterns and processes
- Collect and analyse ecological data in order to evaluate hypotheses

Final exam

Due: **S2 exam period**

Weighting: **30%**

You will apply ecological concepts introduced during this course to solve a variety of problems. You will be asked to interpret data of the type collected during this course.

On successful completion you will be able to:

- Explain how organisms interact with each other and their environment
- Analyse how biological interactions influence patterns of distribution and abundance
- Analyse the structure of and changes in populations, communities, and ecosystems
- Apply ecological concepts to novel situations, especially to contemporary issues
- Identify appropriate scientific journal articles, and critically evaluate and synthesise key concept and conclusions.
- Develop questions and pose hypotheses about ecological patterns and processes

Delivery and Resources

Required and recommended texts and/or materials

The recommended textbook is:

Begon M, Howarth RW, Townsend CR (2014) *Essentials of ecology*. 4th edition. Blackwell Scientific Publications, Cambridge (This is available at the library in special reserve or alternatively can be purchased at the Co-op bookshop). The 3rd (2008) edition is also acceptable, if you can come by it second hand.

Other text books also available in special reserve:

- Begon M, Harper JL, Townsend CR (1996) *Ecology: individuals, populations and communities*. 3rd Edition. Blackwell Science, Boston.
- Krebs CJ (2001) *Ecology: the experimental analysis of distribution and abundance*. 5th Edition. Benjamin Cummings, Publishers, San Francisco, London
- Krebs CJ (2008) *The ecological world view*. 5th Edition. CSIRO Publishing, Collingwood
- Ricklefs R, Miller GL (2000) *Ecology*. 4th Edition. WH Freeman and Co. New York.
- Underwood AJ (1997) *Experiments in ecology: their logical design and interpretation using analysis of variance*. Cambridge University Press, New York.

Unit web page

PowerPoint slides as PDF documents, lecture recordings (on Echo360), unit readings, copies of all unit hand-outs and helpful resources for completion of assessments will be available through iLearn. Consequently, it is strongly recommended that you interact with the BIOL227 iLearn site regularly. **To access the online unit, go to <https://iLearn.mq.edu.au/login/MQ/> and type in your Macquarie OneID Username and password.**

New to iLearn? You can find out more at: http://www.mq.edu.au/iLearn/student_info/

Experiencing difficulties? Visit: <http://informatics.mq.edu.au/help/>

Unit Schedule

Classes

The unit consists of 2 lectures per week (available to external students via Echo360) and either

- a 4 hour practical per week (weeks 1-6) for internal students *or*
- a weekend on-campus session for externals (Sat 15 & Sun 16 August)

There is a **compulsory** field trip to Smiths Lake in the September vacation that **all** students enrolled in this unit must attend. **Students who cannot attend the fieldtrip should NOT enrol in this unit.**

- *Lectures:* Monday 3 pm (E7B T5) AND Tuesday 10 am (E7B T5)
- *Practicals (internal students):* Tuesday 2-6 pm and Wednesday 9-1 pm OR (weeks 1-6 only)
- *On campus session (external students):* 15-16 August (9am -5pm)
- *Field trip (compulsory for ALL students):* **A:** 17-21 September OR **B:** 21-25 September

Lecture timetable *NB: All internal students are expected to attend every lecture**

Part 1. Ecological Methods and Organisms and their environment

WEEK 1

27th July 1. Ecology: what is it and how is it done? (LB: Dr Linda Beaumont)

28th July 2. Conditions, resources and the niche concept (LB)

WEEK 2

3rd August 3. Distributions (LB)

4th August 4. An introduction to ecological field sampling (KM: Dr Katherine McClellan)

WEEK 3

10th August 5. Global patterns of productivity (LB)

11th August 6. Effects of environment on life history (LB)

WEEK 4

17th August 7. Population growth and intraspecific competition (LB)

Part 2. Interactions among species

18th August 8. Interspecific competition (LB)

WEEK 5

24th August 9. Predation (LB)

25th August 10. Parasitism and disease (Dr Michelle Power)

WEEK 6

1st September 11. Facilitation (LB)

Part 3. Communities and ecosystems

2nd September 12. Describing community structure: diversity and species richness (LB)

WEEK 7

7th September 13. The more the merrier: why biodiversity matters (KM)

field trip preparation...

8th September 14. An introduction to the Smith's Lake environment (KM)

WEEK 8

28th September 15. Processes influencing community structure: disturbance and succession (KM)

29th September 16. Processes influencing community structure: island biogeography (KM)

WEEK 9

6th October 17. The flux of energy through food webs (KM)

7th October 18. The flux of matter through food webs (KM)

WEEK 10

12th October 19. Spatial subsidies: another time, another place (KM)

Part 4. Applied ecological issues

13th October 20. Ecological impact assessment (KM)

WEEK 11

19 th October	20. Restoration ecology (KM)
20 th October	21. Invasive species and their management (KM)

WEEK 12

26 th October	22. Managed ecosystems: agriculture, fisheries and forestry (KM)
27 th October	23. Global climate change (LB)

WEEK 13

2 nd November	Exam discussion, revision, 300-level unit information (LB/ KM)
3 rd November	No lecture – personal study for the exam

Practical classes

For all practical sessions you must be wearing covered shoes to be allowed entry to the labs and there is strictly no eating or drinking.

Timetable for internal students

Due to renovations, the location for pracs is subject to change. Please ensure that you check iLearn prior to coming to prac classes. External students will be expected to read the timetable on iLearn prior to attending the on-campus session.

Week 1	28-29 July	Practical induction and Niche Prac
Week 2	4-5 August	Group Practical Part 1
Week 3	11-12 August	Group Practical Part 2
Week 4	18-19 August	Group Practical Part 3
Week 5	25-26 August	Oral Presentations
Week 6	2-3 September	Oral Presentations

Practical induction

Please meet at the Biology Tea Room (E8A 280) to run through some safety issues pertaining to

the pracs in weeks 2-4. We will also hold a question and answer session on sign-up, payment and requirements for the Smiths Lake field trip. We will then go to our labs to conduct a modelling prac based on species' fundamental and realised niches.

Group Practical weeks 2-4

The practicals during the first half of the semester are focused around the concept of problem-based learning. In Week 2, you will be taken for a walk around the campus and the nearby Ecology Reserve to introduce you to a number of ecosystems. During the walk, you will make observations regarding the distribution and abundance of organisms, from which you will develop research hypotheses. After returning to the lab you will form a group of 3-4 students, decide on a single hypothesis that you will test, and come up with the research plan. The plans will be discussed by the whole class so there is an opportunity for feedback. Once each plan is finalised, you will come up with a list of necessary equipment. In Week 3, the research plan will be carried out. In Week 4, there will be a tutorial on graphing and statistical analysis. You will have time to collate and process your results in your group. Full prac notes will be provided in the first week.

Important:

In weeks 2 and 3 you will be walking to the Macquarie University Ecology Reserve to collect data for the group practical. Please dress appropriately with **sturdy fully enclosed walking shoes** and **long pants**. **Those who are not appropriately dressed will not be able to do the prac and will therefore lose the marks allocated to it.** The prac will go ahead **regardless of the weather**, so bring rain gear if the weather looks doubtful.

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

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

Disruption to Studies Policy 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/

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://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

- Identify appropriate scientific journal articles, and critically evaluate and synthesise key concept and conclusions.
- Identify and synthesise important ecological principles.

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 how organisms interact with each other and their environment
- Analyse how biological interactions influence patterns of distribution and abundance
- Analyse the structure of and changes in populations, communities, and ecosystems
- Apply ecological concepts to novel situations, especially to contemporary issues
- Identify and synthesise important ecological principles.
- Develop questions and pose hypotheses about ecological patterns and processes
- Collect and analyse ecological data in order to evaluate hypotheses

Assessment tasks

- Weekly quizzes
- Practical Report
- Smiths Lake Report
- 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

- Explain how organisms interact with each other and their environment
- Analyse how biological interactions influence patterns of distribution and abundance
- Analyse the structure of and changes in populations, communities, and ecosystems
- Apply ecological concepts to novel situations, especially to contemporary issues
- Identify appropriate scientific journal articles, and critically evaluate and synthesise key concept and conclusions.
- Identify and synthesise important ecological principles.
- Develop questions and pose hypotheses about ecological patterns and processes
- Collect and analyse ecological data in order to evaluate hypotheses

Assessment tasks

- Weekly quizzes
- Oral Presentation
- Practical Report
- Field trip graphing exercises
- Smiths Lake Report
- 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

- Analyse how biological interactions influence patterns of distribution and abundance
- Analyse the structure of and changes in populations, communities, and ecosystems
- Apply ecological concepts to novel situations, especially to contemporary issues
- Identify appropriate scientific journal articles, and critically evaluate and synthesise key concept and conclusions.
- Identify and synthesise important ecological principles.
- Develop questions and pose hypotheses about ecological patterns and processes
- Collect and analyse ecological data in order to evaluate hypotheses

Assessment tasks

- Weekly quizzes
- Oral Presentation
- Practical Report
- Smiths Lake Report
- 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:

Assessment tasks

- Oral Presentation
- Practical Report
- Field trip graphing exercises
- Smiths Lake Report

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

- Apply ecological concepts to novel situations, especially to contemporary issues
- Identify and synthesise important ecological principles.

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 how organisms interact with each other and their environment
- Apply ecological concepts to novel situations, especially to contemporary issues
- Collect and analyse ecological data in order to evaluate hypotheses

Changes since First Published

Date	Description
20/07/2015	Updated lecture schedule to reflect 2015 dates Extra prac has opened 2-6pm Wednesdays Altered Prac 5&6 content for oral presentation assessment