



BIOL347

Plants and Ecosystems

S2 External 2015

Dept of Biological Sciences

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Disclaimer

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General Information

Unit convenor and teaching staff

Convenor

A/Prof Ian Wright

ian.wright@mq.edu.au

Contact via email (preferred) or phone (02 9850 4228)

E8C210

Consultation hours yet to be finalised

Guest Lecturer

A/Prof Brian Atwell

brian.atwell@mq.edu.au

Contact via email or phone (02 9850 8224)

E7B244

Guest Lecturer

Prof Belinda Medlyn

b.medlyn@uws.edu.au

Contact via email

Guest Lecturer / prac leader

Dr Ross Peacock

ross.peacock@mq.edu.au

Contact via email

Technical Staff

Muhammad Masood

muhammad.masood@mq.edu.au

Contact via email preferred

F5A427

Tutor

Emma Gray

emma.gray2@students.mq.edu.au

Expert in plant identifications

Alison Downing

Expert in plant identifications

Karen Marais

Credit points
3
Prerequisites
39cp including (BIOL227 or BIOL210 or ENVE266)
Corequisites
Co-badged status
Unit description
<p>This unit draws together elements of plant ecology, evolution and ecophysiology, and will be useful for students with interests at many scales, including plant conservation, ecology, and environmental science. Topics will include: An overview of Australian and global plant communities; Methods for describing and sampling vegetation; Plant functional traits and ecological strategies; Basic physiology of photosynthesis, respiration and plant water use; Plant functions and fluxes at landscape-scale; Impact of climate change on plants and communities. Fieldwork is an important component of the unit. Students also gain experience in plant identification and in data analysis. A basic understanding of statistics is expected.</p>

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:

- Describe the major patterns of plant distribution globally and within Australia
- Recognise and describe features of major Australian plant families
- Describe major features of photosynthesis, respiration, plant water use and nutrient use, both at physiological and ecosystem scales
- List and discuss plant adaptations to major environmental factors (and limitations)
- Demonstrate understanding of the role of plant functional traits in plant ecological strategies
- Design field sampling and analyse data to describe vegetation communities
- Collect, analyse and present ecophysiological data
- Describe the basis of expected impacts of global change on plant functions

General Assessment Information

In order to complete this unit satisfactorily it is mandatory to:

- Complete all assessable tasks
- Achieve satisfactory progress in all assessable tasks
- Attend both on-campus sessions

Preparation of written reports

Please use the following list to check your assignments before electronic submission.

- Report is typewritten
- Text is the required length
- Text has been proof-read and spell-checked
- References are reputable sources
- References are cited at appropriate points within the text
- Formatting of references in the text and in the reference list is correct
- Assignment is your own work - not copied verbatim from reference sources or other students. (see note on plagiarism, below, and the relevant University Policy)
- Text has been proof-read and spell-checked (please!)

Note: written feedback on written assessment tasks will be provided within 3 weeks of submission.

Referencing

Both written reports (Assessments 1 and 3, below) will require references. The references you consult may include textbooks, edited books or scientific journals. References should be listed in alphabetical order at the end and are not to be included in the word count.

There are different styles of referencing – each journal has its own individual style. For BIOL347 this year we have chosen to follow the style of *Austral Ecology* journal. For example,

Book:

Atwell B. J., Kriedemann P. E. & Turnbull C. G. N. (1999) *Plants in action: adaptation in nature, performance in cultivation*. MacMillan Education Australia, Melbourne.

Chapter in edited book:

Cornelissen J. H. C., Castro-Diez P. & Carnelli A. L. (1998) Variation in relative growth rate among woody species. In: *Inherent variation in plant growth. Physiological mechanisms and ecological consequences* (eds H. Lambers, H. Poorter and M. M. I. Van Vuuren) pp. 363-92. Backhuys Publishers, Leiden.

Journal article:

Grime J. P. & Hunt R. (1975) Relative growth-rate: its range and adaptive significance in a local flora. *J Ecology* 63, 393-422.

In the main text of your report these sources would be cited as (Atwell *et al.* 1999; Cornelissen *et al.* 1998; Grime & Hunt 1975). Consult a recent issue of the journal if unsure about how to cite and format literature sources.

Penalties

5% of the marks for the written assignments will be deducted for each day they are late, and assignments will not be accepted for marking if more than 10 days overdue. Exceptions can be granted (by the Convenor) if there are sufficiently serious medical or other extenuating circumstances (**appropriate supporting documentation should be provided**).

Penalties will be applied for reports being noticeably over the word limit, and increasingly so the more over the limit they are.

Plagiarism. Students are required to submit Assignments 1 and 3 via the plagiarism detection software Turnitin. This can be accessed on the unit's iLearn website. Your assessment task will be automatically compared to work of your classmates, previous students from Macquarie and other universities, and with material available on the Internet. The results of the analysis will be sent to the unit Convenor. Any evidence of plagiarism will be dealt with following University policy. The penalties imposed by the University for plagiarism are serious and may include loss of marks, referral to a Faculty disciplinary committee, or even expulsion from the University.

Assessment Tasks

Name	Weighting	Due
<u>Vegetation analysis prac</u>	20%	07/09/2015
<u>Seminar on a journal article</u>	10%	23/09/2015
<u>Seedling growth prac</u>	25%	19/10/2015
<u>Class participation</u>	10%	continuing
<u>Final examination</u>	35%	TBA

Vegetation analysis prac

Due: **07/09/2015**

Weighting: **20%**

Assessment 1. Vegetation communities of Dog Pound Creek Reserve

You are asked to submit a report on the practical work conducted at Dog Pound Creek and

follow-up data analysis (first on-campus session, August 15-16). The report should describe the vegetation communities of the site and how these relate to environmental factors (**more details will be given during the on-campus session and in prac notes, downloadable from iLearn**). Your report should be written in the style of a scientific paper with an Abstract, Introduction, Methods, Results and Discussion. You should also include references cited, figures & tables as appropriate. Word count (maximum; excluding references): 3000 words. Journal style: *Austral Ecology*.

On successful completion you will be able to:

- Design field sampling and analyse data to describe vegetation communities

Seminar on a journal article

Due: **23/09/2015**

Weighting: **10%**

Assessment 2: Seminar on a journal article of your choice

You are asked to choose a journal article published in the last 5 years on a plant ecology, ecophysiology or vegetation science topic that interests you, and during the second on-campus session (Sept 23-25) to present an 8 minute talk (with a further 2 minutes for questions) that is a summary and critical appraisal of the article. Students will be assessed on the seminar content and presentation quality, and their ability to answer questions.

When giving your seminar one of the staff will give a signal at 7 minutes, meaning you have one minute to finish up. If you continue talking much into the 2 minutes set aside for questions the “ability to answer questions” component of your mark will suffer. (so, please keep to time!)

A data projector and laptop will be available for Powerpoint or PDF presentations. Please bring your presentation on a USB drive disk (that has recently been checked for viruses!). Include in your talk:

- The question being addressed in the article and why it is important
- A description of the methods
- A critical analysis of the results
- An evaluation of the wider implications of their findings.

Articles may be found in journals such as *Austral Ecology*, *Australian Journal of Botany*, *Ecology*, *Ecology Letters*, *Functional Ecology*, *Functional Plant Biology*, *Global Ecology & Biogeography*, *Journal of Ecology*, *Journal of Vegetation Science*, *Journal of Biogeography*.

On successful completion you will be able to:

- Describe the major patterns of plant distribution globally and within Australia
- Recognise and describe features of major Australian plant families
- Describe major features of photosynthesis, respiration, plant water use and nutrient use,

both at physiological and ecosystem scales

- List and discuss plant adaptations to major environmental factors (and limitations)
- Demonstrate understanding of the role of plant functional traits in plant ecological strategies
- Describe the basis of expected impacts of global change on plant functions

Seedling growth prac

Due: **19/10/2015**

Weighting: **25%**

Assessment 3: Written report on lab-based prac

You are asked to submit a report on the **Seedling Traits and Growth Rates** practical. This prac will be introduced during the first on-campus session, and is the chief focus of the second on-campus session. Maximum seedling growth rates achieved under near-optimal growth conditions are widely regarded as a key element of plant ecological strategy. The over-arching question in this prac is: "What plant traits are the key drivers of differences among species in their seedling growth rates?". We are growing in the glasshouses seedlings of a variety of local native species, with half the plants grown under elevated atmospheric CO₂ concentration and half under ambient CO₂. In your own time (and in conjunction with our class Technician and/or Tutor) students will work as groups to make various trait measurements on glasshouse-grown seedlings (during semester weeks 5-6), or harvest seedlings for measurements of leaf areas, biomass etc (during week 7). During the second on-campus session we will process plant material so as to calculate seedling growth rates and other traits, compile data into spreadsheets, discuss research questions, and start analyses.

A written report on this work will be due on October 19th. Your report should be written in the style of a scientific paper with an Abstract, Introduction, Methods, Results and Discussion. You should also include references cited, figures & tables as appropriate. Maximum length, excluding references is 3000 words. Journal style: *Austral Ecology*.

On successful completion you will be able to:

- Demonstrate understanding of the role of plant functional traits in plant ecological strategies
- Collect, analyse and present ecophysiological data

Class participation

Due: **continuing**

Weighting: **10%**

Assessment 4: Class participation

You will be assessed for your participation in all aspects of the on-campus sessions (e.g., contributing to field tasks, submitting data sheets, asking engaged questions, participating in

group discussions, asking questions during question time of other student's talks).

Internal students: as described under "Assessment 3: Written report on lab-based prac", during weeks 5-7 you are expected to collect ecophysiological trait data on glasshouse-grown seedlings. This activity contributes substantially to your mark for class participation.

External students who are unable to make on-campus trait measurements for Assessment 3 during weeks 5-7 (see above) will be given a small extra assessment task which will instead contribute to their formal mark for class participation:

You are asked to submit directly to the unit Convenor (**by email, by Sept 23**) a one-page justification for the article you chose for your seminar. Please provide the publication details of the article (authors, year, title, journal, volume and page numbers) and a short summary of the general background, questions addressed, approaches used and key findings. Justify why you think this is a good choice for your oral seminar. Do not just repeat the Abstract of the paper – it must be in your own words.

On successful completion you will be able to:

- Design field sampling and analyse data to describe vegetation communities
- Collect, analyse and present ecophysiological data

Final examination

Due: **TBA**

Weighting: **35%**

Assessment 5: Final examination

The final examination will consist of a series of multiple choice and short-answer questions that are designed to test understanding of the concepts taught in this course. Length: 3 hours, plus 10 minutes reading time.

On successful completion you will be able to:

- Describe the major patterns of plant distribution globally and within Australia
- Recognise and describe features of major Australian plant families
- Describe major features of photosynthesis, respiration, plant water use and nutrient use, both at physiological and ecosystem scales
- List and discuss plant adaptations to major environmental factors (and limitations)
- Demonstrate understanding of the role of plant functional traits in plant ecological strategies
- Describe the basis of expected impacts of global change on plant functions

Delivery and Resources

Requirements for Practical classes

The work carried out during practical classes is an important and integral part of the course. You must read, download and either print the prac notes to bring to each class, or bring them on a laptop or tablet.

Laboratory requirements

- Notebook and pencils/pens for notes & diagrams
- Laptop, if you have one, with Excel and Word (or open source equivalents)
- USB data stick to transfer data (recently checked with anti-virus software)
- Enclosed shoes (**you cannot be present in the lab or field without these**)
- No food or drink in University laboratories
- Please switch mobile phones off

Field requirements

- Clip board for field sheets
- Pencils/pens for notes
- Hand lens, if you have one (available from U@MQ shop)
- Appropriate clothing (walking shoes or boots, rain jacket, sun protection, trousers and long sleeved shirt)
- Water bottle and lunch/snacks
- Small back pack to carry your equipment
- Insect repellent and first aid kits will be supplied

NOTE 1: The field work will require a short 10 minute walk into a reserve and working in uneven terrain. Any students with medical issues or requiring assistance should indicate this on their fieldwork participation form. **All students must submit this form otherwise they cannot participate in the fieldwork. Please submit this form, via iLearn, by Wednesday 5th August.**

NOTE 2: After rain there can be rather a lot of leeches present at Dog Pound Creek. Leeches are non-toxic and do not carry disease, but they are still a nuisance. To minimize chances of leech problems we suggest tucking your pants into your socks, shirts into pants, etc, and liberally applying insect repellent to your shoes, clothes and exposed skin. Initially leeches can be removed by flicking, but once well attached the best way to remove a leech is with salt. Apply a band-aid immediately, since they inject an anti-coagulant to ensure a nice blood flow. (MQ field staff have First Aid kits and are accredited in first aid). Ticks are a possibility but can be readily detached, are also discouraged by insect repellent.

Recommended Reading

There is no set textbook for this subject. Recommended books (all available on Reserve in the

library) that, between them, cover many of the topics dealt with in lectures include:

- Attiwill PM & Wilson B (Eds) (2006). *Ecology : An Australian Perspective*. Oxford University Press, South Melbourne, Vic.
- Atwell BJ, Kriedemann PE & Turnbull CGN (1999). *Plants In Action: Adaptation In Nature, Performance In Cultivation*. MacMillan Education Australia, Melbourne.
- Chapin FSI, Matson PA & Mooney HA (2002). *Principles of Terrestrial Ecosystem Ecology*. Springer, New York.
- Gurevitch J, Scheiner SM & Fox GA (2006). *The Ecology of Plants*. Sinauer Associates, Inc. Publishers, Sunderland, MA. 2nd Edition.
- Lambers H, Chapin FS & Pons TL (1998). *Plant Physiological Ecology*. Springer-Verlag, New York.
- Pugnaire FI & Valladares F (Eds) (2007). *Functional plant ecology*. CRC Press, Boca Raton. 2nd Edition.
- Raven PH, Evert RF, Eichhorn SE (2013). *Biology of plants*. WH Freeman, New York. 8th Edition. (or 7th edition – published 2005).
- Willis KJ & McElwain JC (2014). *The Evolution of Plants*. Oxford University Press, Oxford. 2nd Edition.

Most or all lectures will include a list of key readings (journal articles, book chapters etc). Where possible we will make these available, whether through the Library Reserve or through the unit iLearn page.

Technology Used and required

All course content will be made available via the iLearn unit webpage (URL for iLearn is: <http://ilearn.mq.edu.au/>). You are expected to use iLearn for:

- Regularly checking subject announcements;
- Downloading lecture and reference materials;
- Submitting assignments;
- Checking your grades.

Basic multimedia software (e.g., Windows Media Player or Quicktime) will be needed to listen to recorded lectures. Students will be required to use appropriate software, particularly Excel, for data analysis and graphing. For the vegetation data analysis prac we will pre-load PC-ORD software onto University computers.

Unit Schedule

Lectures will be held on Mondays and Tuesdays, from 10-11 am, in the E8A 386 tutorial room. ("A" wing of E8 building, level 3). Lectures will be made available as PDFs and audio files via

iLearn.

Compulsory on-campus sessions are scheduled for Sat-Sun August 15-16, and Wed-Fri September 23-25. These block practicals are compulsory for all students (internal and external). On Aug 15 we will work for much of the day in the field near Dog Pound Creek, Thornleigh (transport will be provided to/from the University to this location). On other days we will be based at the University. Full information will be posted on the unit's iLearn website well in advance of the on-campus sessions. Most likely they will run from 9.00 am – 5.30 pm, with a slightly earlier start on Aug 15.

Unless otherwise specified we will meet at the beginning of each day at the Glasshouse laboratories (F5A400) at the top of the F5A car park. To get to the glasshouse laboratories from the back of E8C, look to your right across the main campus walkway. The multi-level parking structure you see is the F5A carparks. Go across the main campus walkway, continue on along the back wall of the E6B building and you'll see a set of stairs next to a lift shaft. Go to the top of the stairs and turn left and go through the gate. The building to your right is the Glasshouse labs. The front of the building is the potting up area, the main lab is located at the back of the far end of the building.

DRAFT LECTURE TIMETABLE

** Lecture topic and/or lecturer still to be finalised

Week	Date	Day	L#	Lecture	Lecturer	Theme
1	27-Jul	Mon	1	Introduction (course organisation, texts, assessments). / World vegetation, biomes etc.	Wright	Vegetation ecology
1	28-Jul	Tues	2	The Australian environment and its vegetation	Wright	
2	3-Aug	Mon	3	Australian vegetation (continued); iconic plant families.	Wright	
2	4-Aug	Tues	4	Plant diversity, evolution, phylogenies	Wright	
3	10-Aug	Mon	5	Systematic sampling, description and analysis of plant communities	Peacock	
3	11-Aug	Tues	6	** Disturbance; succession; vegetation states and transitions	Wright	
ON CAMPUS SESSION 1, SAT-SUN AUGUST 15-16						
4	17-Aug	Mon	7	Photosynthesis <i>[pre-recorded lecture]</i>	Atwell	Resource acquisition and use
4	18-Aug	Tues	8	Respiration <i>[pre-recorded lecture]</i>	Atwell	
5	24-Aug	Mon	9	Water physiology and the plant hydraulic system	Atwell	

5	25-Aug	Tues	10	Carbon balance: GPP, NPP, NEP	Medlyn	
6	31-Aug	Mon	11	Plant nutrient acquisition and use	Atwell	
6	1-Sep	Tues	12	Ecosystem water use	Medlyn	
7	7-Sep	Mon	13	Plant growth (& introduction to functional traits)	Wright	
7	8-Sep	Tues	14	Nutrient cycling	Medlyn	
ON CAMPUS SESSION2, WED-FRI SEPTEMBER 23-25						
8	28-Sep	Mon	15	Plant functional traits, ecological strategies & adaptations 1	Wright	Trait ecology
8	29-Sep	Tues	16	Plant functional traits, ecological strategies & adaptations 2	Wright	
9	5-Oct	Mon		[public holiday]		
9	6-Oct	Tues	17	Plant functional traits, ecological strategies & adaptations 3	Wright	
10	12-Oct	Mon	18	Invasive plants & their traits	Leishman	
10	13-Oct	Tues	19	** Impacts of high CO ₂ on forests	Zeppel	Frontiers in plant ecology
11	19-Oct	Mon	20	** Global ecology	Keenan	
11	20-Oct	Tues	21	New data for old ideas: ecoinformatic approaches for understanding Australian plant biogeography	Gallagher	
12	26-Oct	Mon	22	Global Ecophysiology	de Kauwe	
12	27-Oct	Tues	23	Frontiers in plant functional ecology	Wright	
13	2-Nov	Mon	24	Trait-based community assembly theory	Falster	
13	3-Nov	Tues	25	Outroduction. Re-cap some key concepts. Info about exam.	Wright	

** Lecture topic and/or lecturer still to be finalised.

Core lecturers are A/Prof Ian Wright, A/Prof Brian Atwell and Prof Belinda Medlyn.

Guest lecturers : Dr Ross Peacock, Prof Michelle Leishman, Dr Melanie Zeppel, Dr Rachael Gallagher, Dr Trevor Keenan, Dr Martin de Kauwe, Dr Daniel Falster.

DRAFT TIMETABLE: ON-CAMPUS SESSIONS

There are two on-campus sessions (OCS): Saturday-Sunday Aug 15-16; and Wednesday-Friday September 23-25. *These are compulsory for all students.*

OCS	Date	Activities (draft)
1	Aug 15	<ul style="list-style-type: none"> Fieldwork, Dog Pound Creek (Thornleigh). [late afternoon] Compile and validate field data (back at lab).
	Aug 16	<ul style="list-style-type: none"> Vegetation sampling & analysis: discussions; data analyses. [late afternoon] Introduction to lab-based prac (including hands-on demonstration of Li-Cor 6400 InfraRed Gas Analyzer).
2	Sept 23	<ul style="list-style-type: none"> Lab-based prac: sample preparation; data entry; data exploration; discussion of research questions. Seminars.
	Sept 24	<ul style="list-style-type: none"> Plant identification prac, including tour of Biological Sciences Herbarium. Walking excursion into MQ Ecology Reserve. Seminars (continued).
	Sept 25	<ul style="list-style-type: none"> Lab-based prac: Further group discussion of key concepts and possible research questions. Individual data analyses and writing. Seminars (continued).

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

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:

Assessment task

- Seminar on a journal article

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:

Assessment tasks

- Vegetation analysis prac
- Seedling growth prac
- Class participation

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

- Describe the major patterns of plant distribution globally and within Australia
- Recognise and describe features of major Australian plant families
- Describe major features of photosynthesis, respiration, plant water use and nutrient use, both at physiological and ecosystem scales
- List and discuss plant adaptations to major environmental factors (and limitations)
- Demonstrate understanding of the role of plant functional traits in plant ecological strategies
- Design field sampling and analyse data to describe vegetation communities
- Collect, analyse and present ecophysiological data
- Describe the basis of expected impacts of global change on plant functions

Assessment tasks

- Vegetation analysis prac
- Seminar on a journal article
- Seedling growth prac
- Class participation
- 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

- List and discuss plant adaptations to major environmental factors (and limitations)
- Demonstrate understanding of the role of plant functional traits in plant ecological strategies
- Design field sampling and analyse data to describe vegetation communities
- Collect, analyse and present ecophysiological data
- Describe the basis of expected impacts of global change on plant functions

Assessment tasks

- Vegetation analysis prac
- Seminar on a journal article
- Seedling growth prac
- Class participation
- 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

- Design field sampling and analyse data to describe vegetation communities
- Collect, analyse and present ecophysiological data

Assessment tasks

- Vegetation analysis prac
- Seedling growth prac
- Class participation
- 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

- Design field sampling and analyse data to describe vegetation communities
- Collect, analyse and present ecophysiological data

Assessment tasks

- Vegetation analysis prac
- Seminar on a journal article
- Seedling growth prac
- Class participation

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 outcome

- Describe the basis of expected impacts of global change on plant functions

Assessment task

- 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 outcome

- Describe the basis of expected impacts of global change on plant functions

Assessment task

- Final examination

Changes from Previous Offering

The BIOL347 course code was previously used for *Plant Diversity & Conservation*, now rested. In 2015 BIOL347 refers to a new course, “*Plants & Ecosystems*”. This course draws from the old *Plant Diversity & Conservation* and from another rested subject BIOL313 *Plants: Cells to Ecosystems*, but also includes substantial new material on plant functional ecology, and from cutting edge research by high-calibre early-career plant scientists within the Department of Biological Sciences (via a series of guest lectures).