



BIOL362

Freshwater Ecology

S2 Day 2014

Dept of Biological Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor

Grant Hose

grant.hose@mq.edu.au

Contact via grant.hose@mq.edu.au

Credit points

3

Prerequisites

39cp including (BIOL208 or BIOL227 or ENVE334 or ENVE339)

Corequisites

Co-badged status

Unit description

This unit introduces the diverse nature of freshwater ecosystems, their biota, and the physical and chemical factors that have shaped their structure and function. The unit provides a holistic catchment perspective, covering lakes, rivers and estuaries, fish, invertebrates and ecosystem processes. Fieldwork is an important part of this unit, with essential supporting and contextual knowledge provided by laboratory classes and lectures. Students will come to understand the key ecological components in freshwater systems, such as trophic structures, interspecific interactions, and the role of disturbance. Students will also understand how ecological knowledge can be applied to water resource management issues.

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 characteristics and ecological roles of the major biotic groups in freshwater ecosystems.

Identify common freshwater invertebrate taxa to the family level

Apply various field methods for sampling freshwater biota

Identify and address the risks associated with fieldwork in and around water

Describe the various ecosystem services provided by freshwater ecosystems and their

biota

Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions

Assess the health of river and stream ecosystems using the AUSRIVAS method, including sampling

Prepare and edit scientific reports to a professional standard

General Assessment Information

Assignment description

Freshwater ecosystems of the world

Students will provide photos of different freshwater ecosystems. In around 300 words, identify the social and ecological significance of each site and the threats each faces. Photos will be shared with the class via Panoramio which is accessible via a link in iLearn. By way of comments online, identify links, connections or similarities between each of your sites and 5 other locations described by classmates.

Report editing & review

Reviewing the work of others is an important part of scientific writing and research. Students will bring to class completed introduction and methods sections of their scientific report. These sections will be distributed among the class and each student will edit and review the work of another. Submissions will be anonymous. You will receive the feedback and comments made by your classmates who have reviewed your work.

Scientific Report

Students will complete a scientific report on a field-based survey of aquatic habitats in the Kangaroo River-Shoalhaven Catchment. Biological data will be collected on the field trip. Students will be expected to identify the invertebrates collected and report on the diversity found and process other samples collected as directed in class. The report will follow the standard format for a professional scientific report, i.e., it will have an abstract/summary, introduction, materials and methods, results and discussion sections and appendices. It will be appropriately referenced. Further details of the assignment requirements will be given in class or online.

AUSRIVAS prac task

Short written exercises will be completed. The exercises relate to the use of the AUSRIVAS method for stream health assessment. Task is to be completed online. The first exercise is to be completed prior to the AUSRIVAS field day, the second exercise to be completed by the later

due date.

Mid-semester Quiz

A quiz will be held during class time in the first week after the mid semester break. The quiz will cover all material from prac classes, lectures and online learning activities given prior to the mid semester break.

Attendance at guest lectures

Attendance at five guest lectures. Marked as pass/fail based on attendance for whole lecture.

Assignment submission

All written assignments must be handed in according to the Faculty of Science procedures. Assignments should have a cover sheet attached (**which includes a bar code**) and be placed in collection boxes in the reception area of the Science Centre, E7A level 1. Outside normal hours, a collection box will be available in the entrance of E7A. Assignment cover sheets can be created and downloaded from <http://web.science.mq.edu.au/intranet/lt/barcode/coversheet.php> or from the unit iLearn page.

The scientific report and essay must be submitted to Turnitin. Details of submission **for Turnitin will be provided in class or online.**

Extensions and penalties

The penalty for late submission is a deduction of 10% of the mark allocated per day that any work is submitted late.

The deadlines for assignments are not negotiable. Only a medical certificate or a letter with appropriate supporting documents outlining other serious, extenuating circumstances can be used to submit an assignment after the due date without penalty. All applications for special consideration or extension must be sought *before the due date* unless this is absolutely impossible. **All applications for extensions of deadlines must be submitted to the subject convenor.**

The penalties imposed by the University for plagiarism are serious and may include expulsion from the University. ANY evidence of plagiarism WILL be dealt with following University policy.

Returning assessment tasks

Where practicable, assessment tasks will be returned in class; otherwise they will be available for collection from the Faculty of Science Centre.

Assessment Tasks

| Name | Weighting | Due |
|--|-----------|-------------------|
| <u>FW ecosystems of the world</u> | 10% | 25/8/2014 |
| <u>Mid semester quiz</u> | 25% | 9/10/14 |
| <u>AUSRIVAS Prac Tasks</u> | 15% | 15/10/14, 7/11/14 |
| <u>Report editing & review</u> | 5% | 30/10/2014 |
| <u>Scientific Report</u> | 40% | 14/11/2014 |
| <u>Guest lecture participation</u> | 5% | multiple |

FW ecosystems of the world

Due: **25/8/2014**

Weighting: **10%**

Students will provide photos of different freshwater ecosystems. In around 300 words, identify the social and ecological significance of each site and the threats each faces.

On successful completion you will be able to:

- Describe the characteristics and ecological roles of the major biotic groups in freshwater ecosystems.
- Describe the various ecosystem services provided by freshwater ecosystems and their biota
- Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions

Mid semester quiz

Due: **9/10/14**

Weighting: **25%**

In-class quiz on all material presented during lectures and prac classes.

On successful completion you will be able to:

- Describe the characteristics and ecological roles of the major biotic groups in freshwater ecosystems.
- Describe the various ecosystem services provided by freshwater ecosystems and their biota

- Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions
- Prepare and edit scientific reports to a professional standard

AUSRIVAS Prac Tasks

Due: **15/10/14, 7/11/14**

Weighting: **15%**

Pre- and post-prac tasks associated with AUSRIVAS training

On successful completion you will be able to:

- Assess the health of river and stream ecosystems using the AUSRIVAS method, including sampling

Report editing & review

Due: **30/10/2014**

Weighting: **5%**

Students will bring to class completed introduction and methods sections of their scientific report. These sections will be distributed among the class and each student will edit and review the work of another.

On successful completion you will be able to:

- Prepare and edit scientific reports to a professional standard

Scientific Report

Due: **14/11/2014**

Weighting: **40%**

Students will complete a scientific report on a field-based survey of aquatic habitats in the Kangaroo River-Shoalhaven Catchment.

On successful completion you will be able to:

- Identify common freshwater invertebrate taxa to the family level
- Apply various field methods for sampling freshwater biota
- Identify and address the risks associated with fieldwork in and around water
- Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions
- Prepare and edit scientific reports to a professional standard

Guest lecture participation

Due: **multiple**

Weighting: **5%**

Attendance at guest lectures.

On successful completion you will be able to:

- Describe the characteristics and ecological roles of the major biotic groups in freshwater ecosystems.
- Describe the various ecosystem services provided by freshwater ecosystems and their biota
- Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions

Delivery and Resources

This course is delivered as 2 x 1 h lectures and 1 x 3-4 h prac class per week. Attendance at practical sessions is compulsory. Lectures will be recorded but some classes will be delivered in workshop or tutorial format for which the usual audio recording will not capture all class content. Students are advised to attend all classes where possible.

The course includes a compulsory field trip on the 5-7 September 2013. There will be a cost of \$25 for travel during the trip. Students will be responsible for organising and providing their own food and accommodation. Further details of the trip will be provided early in semester.

Lecture graphics and iLectures will be available on iLearn <http://ilearn.mq.edu.au>

We expect you to use iLearn for:

- Regularly checking subject announcements;
- Downloading lecture materials;
- Downloading laboratory materials;
- Downloading reference materials;
- Checking your grades.

Suggested Reading

- Boulton AJ, Brock MA 1999. *Australian Freshwater Ecology: Processes and Management*, CRCFE, Canberra.
- Closs G, Downes B, Boulton AJ 2004. *Freshwater Ecology: A Scientific*

Introduction. Blackwell, Melbourne.

- Gooderham J, Tsyrlin E 2002. *The Waterbug Book*, CSIRO Publishing, Victoria.
- Moss B 2010. *Ecology of Fresh Waters: A View for the Twenty-First Century*, Wiley-Blackwell, Chichester, UK.
- Williams WD 1980. *Australian Freshwater Life*, MacMillan, Melbourne.
- Williams WD 1983. *Life in Inland Waters*, Blackwell, Melbourne.

Unit Schedule

Unit completion requirements

Students must complete all assessable tasks AND receive a final mark of >50% to pass this subject.

UNIT SCHEDULE

Website

Lecture graphics and iLectures will be available on iLearn <http://ilearn@mq.edu.au>

iLearn is a web-based computer mediated communication package and can be accessed by most web browsers from inside or outside the University. iLearn and email will be the principle method of communication in this subject.

We expect you to use iLearn to:

- Regularly check subject announcements
- Download lecture materials
- Download laboratory materials
- Download reference materials
- Check your grades

How do you log in? The URL for the iLearn log in page is: <http://ilearn.mq.edu.au/>. You will need to log in to iLearn each time you use it. Your user name is your student number. If you are having trouble accessing your online unit due to a disability or health condition, please go to the Student Services Website at <http://sss.mq.edu.au/equity/about> for information on how to get assistance. If you cannot log in after ensuring you have entered your username and password correctly, you should contact Student IT Help, Phone: (02) 9850 4357 (in Sydney) or 1 800 063 191 (outside Sydney).

Timetable

| | | |
|--------------------------|------------------------------|--------------------------|
| Lecture 1 | Wednesday 11 – 12 pm | C5A 229 |
| Lecture 2 | Thursday 9 – 10 am | E5A 120 |
| Practical session | Thursday 10 am – 1 pm | F7B 102, 105, 110 |

Compulsory field trip 17-19 September 2014

Full day lab session 3 October 2014 (mid semester break, 9am-4 pm)

Lecture topics

| Week | Date | Number | Topic | Lecturer |
|------|---------|--------|--|-----------------------|
| 1 | 6/8/14 | 1 | Introduction, properties of freshwater | Grant Hose |
| | 7/8/14 | 2 | The nature of FW ecosystems in Australia | Grant Hose |
| 2 | 13/8/14 | 3 | Rivers, processes and biota | Grant Hose |
| | 14/8/14 | 4 | Water chemistry | Grant Hose |
| 3 | 20/8/14 | 5 | Primary producers | Grant Hose |
| | 21/8/14 | 6 | Online Lecture – Catchment Hydrology | Kirstie Fryirs |
| 4 | 27/8/14 | 7 | Microbial ecology | Josie Lategan |
| | 28/8/14 | 8 | Lakes & Reservoirs | Grant Hose |
| 5 | 3/9/14 | 9 | Groundwater | Grant Hose |
| | 4/9/14 | 10 | Wetlands | Tim Ralph |
| 6 | 10/9/14 | 11 | Invertebrates | Grant Hose |
| | 11/9/14 | 12 | On droughts and flooding rains | Online readings |
| 7 | 17/9/14 | 13 | Estuaries | Melanie Bishop |
| | 18/9/14 | 14 | No Lecture – Field trip | Grant Hose |
| | 3/10/14 | | On Campus session - Bug ID & report prep | |
| | | | Mid-semester break | |

| | | | | |
|----|----------|----|--|-----------------------------|
| 8 | 1/10/14 | 15 | Fish | Culum Brown |
| | 2/10/14 | 14 | No Lecture – Extended prac session | |
| 9 | 8/10/14 | 15 | Stream habitat conservation & restoration | Darrell Kemp |
| | 9/10/14 | 16 | No Lecture – AUSRIVAS fieldwork | |
| 10 | 15/10/14 | 17 | Climate change & freshwater ecosystems | Grant Hose |
| | 16/10/14 | 18 | No Lecture – Extended prac session | |
| 11 | 22/10/14 | 19 | Threats to freshwater ecosystems | Jane Williamson |
| | 23/10/14 | 20 | Research and careers in freshwater | Marcus Lincoln Smith |
| 12 | 29/10/14 | 21 | Freshwater pollution & ecotoxicology | Grant Hose |
| | 30/10/14 | 24 | No lecture | |
| 13 | 5/11/14 | 25 | No lecture | |
| | 6/11/14 | 26 | No lecture | |

Practical sessions

| Week | Class date | Activity |
|------|------------|----------|
| 1 | 7/8/14 | No Prac |

| | | |
|-------|----------|---|
| 2 | 14/8/14 | Freshwater plants |
| 3 | 21/8/14 | Manly Dam **10 am start at Manly Dam |
| 4 | 28/8/14 | Zooplankton sampling and ID |
| 5 | 4/9/14 | Catchment mapping & field trip prep |
| 6 | 11/9/14 | No Prac |
| 7 | 18/9/14 | Field Trip 17-19 Sept * more details provided on iLearn |
| Break | 3/10/14 | All day prac session |
| 8 | 2/10/14 | Mid semester quiz Invert ID, data discussion and writing workshop 9 am start |
| 9 | 9/10/14 | AUSRIVAS sampling ** 9 am start, Terry's Ck |
| 10 | 16/10/14 | Report review & AUSRIVAS data analysis 9 am start |
| 11 | 23/10/14 | Freshwater Research @ Macquarie |
| 12 | 30/10/14 | No Prac |
| 13 | 6/11/14 | No Prac |

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/

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

- Apply various field methods for sampling freshwater biota
- Identify and address the risks associated with fieldwork in and around water
- Assess the health of river and stream ecosystems using the AUSRIVAS method, including sampling
- Prepare and edit scientific reports to a professional standard

Assessment tasks

- AUSRIVAS Prac Tasks
- Report editing & review
- Scientific Report

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 outcome

- Identify and address the risks associated with fieldwork in and around water

Assessment tasks

- Report editing & review
- Guest lecture 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 characteristics and ecological roles of the major biotic groups in freshwater ecosystems.
- Identify common freshwater invertebrate taxa to the family level
- Apply various field methods for sampling freshwater biota
- Identify and address the risks associated with fieldwork in and around water
- Describe the various ecosystem services provided by freshwater ecosystems and their biota
- Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions
- Assess the health of river and stream ecosystems using the AUSRIVAS method, including sampling

Assessment tasks

- FW ecosystems of the world
- Mid semester quiz
- AUSRIVAS Prac Tasks
- Guest lecture participation

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

- Identify common freshwater invertebrate taxa to the family level
- Identify and address the risks associated with fieldwork in and around water
- Describe the various ecosystem services provided by freshwater ecosystems and their biota
- Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions
- Assess the health of river and stream ecosystems using the AUSRIVAS method, including sampling
- Prepare and edit scientific reports to a professional standard

Assessment tasks

- FW ecosystems of the world
- Mid semester quiz
- Report editing & review
- Scientific Report

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

- Identify common freshwater invertebrate taxa to the family level
- Apply various field methods for sampling freshwater biota
- Identify and address the risks associated with fieldwork in and around water
- Identify physical, chemical and biotic factors in rivers, streams, lakes and aquifers that influence the biota and ecosystem functions

Assessment tasks

- Mid semester quiz
- Scientific Report

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

- Apply various field methods for sampling freshwater biota
- Prepare and edit scientific reports to a professional standard

Assessment tasks

- FW ecosystems of the world
- Mid semester quiz
- Report editing & review

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

- Assess the health of river and stream ecosystems using the AUSRIVAS method, including sampling
- Prepare and edit scientific reports to a professional standard

Assessment tasks

- FW ecosystems of the world
- Mid semester quiz
- Report editing & review
- Scientific Report
- Guest lecture 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

- Identify and address the risks associated with fieldwork in and around water

Assessment tasks

- FW ecosystems of the world
- Guest lecture participation

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

- Describe the characteristics and ecological roles of the major biotic groups in freshwater ecosystems.
- Identify and address the risks associated with fieldwork in and around water
- Assess the health of river and stream ecosystems using the AUSRIVAS method, including sampling