



# BIOL316

## Invertebrate Biology

S1 Day 2018

*Dept of Biological Sciences*

### Contents

|                                       |    |
|---------------------------------------|----|
| <u>General Information</u>            | 2  |
| <u>Learning Outcomes</u>              | 2  |
| <u>General Assessment Information</u> | 3  |
| <u>Assessment Tasks</u>               | 4  |
| <u>Delivery and Resources</u>         | 7  |
| <u>Unit Schedule</u>                  | 8  |
| <u>Policies and Procedures</u>        | 11 |
| <u>Graduate Capabilities</u>          | 13 |
| <u>Changes from Previous Offering</u> | 17 |
| <u>Changes since First Published</u>  | 17 |

#### Disclaimer

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## General Information

Unit convenor and teaching staff

Unit Convenor

Katherine McClellan

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E8B224

by appointment

Kate Barry

[kate.barry@mq.edu.au](mailto:kate.barry@mq.edu.au)

Credit points

3

Prerequisites

(39cp at 100 level or above) including (BIOL262 or BIOL208 or BIOL228 or BIOL229)

Corequisites

Co-badged status

Unit description

This unit explores the fascinating world of invertebrate animals. The unit starts by briefly outlining the diversity and key features of the major groups of invertebrate animals (excluding unicellular organisms), and using phylogenetic analysis to explore evolutionary relationships. Once this is established, we move away from a development and taxonomic focus to discuss major topics including: mating systems, communication, host-parasite relationships, predator-prey interactions, sociality, biological control, climate change, and conservation. These major topics draw on examples from research papers on various groups of invertebrates. This unit is suitable for students who are interested in whole animal biology or biological education, or for students who are interested in further 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:

Classify invertebrates into major taxonomic groups on the basis of morphological traits

Identify morphological, behavioural, and physiological adaptations that allow invertebrates to survive in distinct habitats

Assess how adaptations of invertebrates influence species and community interactions, and ecosystem function

Create hypotheses and design experiments to test those hypothesis by collecting appropriate data

Critically evaluate scientific hypotheses by statistically analysing data, and accurately interpreting results of those analyses

Effectively communicate biological research findings and concepts to diverse audiences including scientists and the general public

## **General Assessment Information**

### **Assessment details**

Details of assessments will be provided on iLearn and in class.

### **Assignment submission**

All assignments will be digitally submitted through the appropriate Turnitin submission link on iLearn. No hardcopy / paper submissions are needed. All assessments need to be written in the students own words. For the taxonomic key you will need to submit four drawings. You will need to make a high quality scan of your scientific drawings (e.g. use the library photocopier / scanner and email yourself a copy) then "paste" the digital copy into your assignment before submission.

### **Academic honesty**

All assessments need to be written in the students own words. 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. Penalties for plagiarism range from a loss of marks to awarding of a zero depending on the level of plagiarism and reporting to Faculty disciplinary committee.

### **Extensions, penalties and Disruptions to Studies**

The deadlines for assignments are not negotiable. If an assignment is submitted late then a penalty of -10% of the mark allocated for the assignment will be deducted per day that the work is late (i.e. 5 days late = -50% of marks available).

If you experience a serious and unavoidable disruption to your studies and require an extension for an assessment please apply for Special Consideration via [ask.mq.edu.au](https://ask.mq.edu.au) with supporting documentation. If you anticipate a potentially serious and unavoidable disruption (e.g. upcoming surgery) speak to the unit convenor early and apply for an extension before the due date.

## Special Consideration for your final examination

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn ([bit.ly/FSESup](http://bit.ly/FSESup)) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination. See the Special Consideration policy [here](#).

## Unit completion

To pass this unit, students need to achieve an overall minimum grade of 50%.

## Assessment Tasks

| Name                                       | Weighting | Hurdle | Due                       |
|--|-----------|--------|---------------------------|
| <a href="#">Lecture Participation</a>      | 5%        | No     | Weekly                    |
| <a href="#">Early assessment quiz</a>      | 5%        | No     | 18/3/18                   |
| <a href="#">Taxonomic Key</a>              | 20%       | No     | Int:3/4/18, Ext:8/4/18    |
| <a href="#">Mid-Session Test</a>           | 10%       | No     | Int: 1/5/18, Ext: 27/4/18 |
| <a href="#">Scientific Journal Article</a> | 20%       | No     | 22/5/18                   |
| <a href="#">Final exam</a>                 | 40%       | No     | TBA                       |

## Lecture Participation

Due: **Weekly**

Weighting: **5%**

During each lecture a couple of questions will be asked and students will need to respond on their smart device (laptop, tablet or phone with ALP app - you need to log into the ALP in iLearn once to activate, if you don't have a device talk to the unit convenor). Participation for **internal** students requires **lecture attendance** and recordings will be muted during activities and activity slide results hidden so that **external** students can participate in a separate **online weekly quiz**.

On successful completion you will be able to:

- Classify invertebrates into major taxonomic groups on the basis of morphological traits
- Identify morphological, behavioural, and physiological adaptations that allow

invertebrates to survive in distinct habitats

## Early assessment quiz

Due: **18/3/18**

Weighting: **5%**

This is an early assessment quiz to help you know how you are doing early on in the unit. It will cover lectures 1-6 and will consist of 20 multiple choice answer questions to be completed at home within the 5 day period (9am Wednesday 14 March - midnight Sunday 18th March).

On successful completion you will be able to:

- Classify invertebrates into major taxonomic groups on the basis of morphological traits

## Taxonomic Key

Due: **Int:3/4/18, Ext:8/4/18**

Weighting: **20%**

Students will develop their own dichotomous / taxonomic key based on all lab specimens provided; identify all specimen; create a short, informative natural-history table for all specimen with appropriate foot note referencing; and draw four accurate, scientific drawings, of four of the lab specimen. Further details will be provided on iLearn and in the prac classes.

On successful completion you will be able to:

- Classify invertebrates into major taxonomic groups on the basis of morphological traits
- Identify morphological, behavioural, and physiological adaptations that allow invertebrates to survive in distinct habitats
- Assess how adaptations of invertebrates influence species and community interactions, and ecosystem function
- Effectively communicate biological research findings and concepts to diverse audiences including scientists and the general public

## Mid-Session Test

Due: **Int: 1/5/18, Ext: 27/4/18**

Weighting: **10%**

A multiple choice answer test on knowledge of course content up to and including week 6. This one hour test will take place in the prac, under closed-book exam conditions during the first prac after the mid-session break (internals) or during the mid-session break OCS (externals).

On successful completion you will be able to:

- Classify invertebrates into major taxonomic groups on the basis of morphological traits

## Scientific Journal Article

Due: **22/5/18**

Weighting: **20%**

Students will complete a scientific research report, written in their own words and based on a data collected in class (externals will need to wait for internals to finish the pracs so all data is available). The report will follow the format of a Current Biology paper - details of which will be provided in class and online in iLearn.

On successful completion you will be able to:

- Create hypotheses and design experiments to test those hypothesis by collecting appropriate data
- Critically evaluate scientific hypotheses by statistically analysing data, and accurately interpreting results of those analyses
- Effectively communicate biological research findings and concepts to diverse audiences including scientists and the general public

## Final exam

Due: **TBA**

Weighting: **40%**

A test on knowledge of course content (lectures, pracs and readings) up to and including week 13.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn ([bit.ly/FSESupp](http://bit.ly/FSESupp)) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

On successful completion you will be able to:

- Classify invertebrates into major taxonomic groups on the basis of morphological traits
- Identify morphological, behavioural, and physiological adaptations that allow invertebrates to survive in distinct habitats
- Assess how adaptations of invertebrates influence species and community interactions, and ecosystem function
- Effectively communicate biological research findings and concepts to diverse audiences

including scientists and the general public

## Delivery and Resources

### Required unit materials

#### Lectures:

Attendance of lectures and practicals is compulsory and there is a participation mark for this unit. For the internal students lectures you will need to bring a device that can connect to the internet to lectures (either a laptop, tablet or smart phone - if you don't have one speak to me about this during the first lecture). For external students you will be required to view the lecture and complete an online quiz question.

#### Practicals:

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.

You will also need a practical notebook with unlined pages that you will use to draw organisms, record data and observations from field and laboratory classes. We recommend you use an **A4 sketch pad** for drawing and a lined note pad for note taking and recording data during classes.

You will need enclosed shoes for every practical class in accordance with standard laboratory safety procedures. Without which you will not be allowed entry to the laboratory.

### Recommended readings

There are a number of books (also available in the library) that cover various aspects of BIOL316:

- Richard C. Brusca; Wendy Moore; Stephen M. Shuster (2016) Invertebrates. Sinauer Associates, Inc., Sunderland, Massachusetts U.S.A.
- Ruppert EE, Fox RS & RD Barnes (2004) Invertebrate zoology: a functional evolutionary approach. 7th ed. Sunders College Publishing (3 copies available in Special Reserve)
- Ponder W & D. Lunney (1999) The Other 99%: The Conservation and Biodiversity of Invertebrates. Transactions of the Royal Zoological Society of NSW. Surrey beattie & Sons, Chipping Norton
- Pechenik, J.A. Biology of the invertebrates. 6th ed. Boston, Mass.: McGraw-Hill, 2010.
- Anderson, D.T. (Ed). Invertebrate zoology. 2nd ed. South Melbourne, Vic.: Oxford University Press, 2001
- Moore, J. Introduction to the invertebrates. Cambridge: Cambridge University Press, 2001.
- Romoser, W.S. & Stoffolano, J.G. The science of entomology. 4th ed. Boston, Mass.:

WCB McGraw-Hill, 1998.

- Choe, J.C. & Crespi, B.J. (Eds). The evolution of mating systems in insects and arachnids. Cambridge; New York: Cambridge University Press, 1997.
- Herrera, C.M. & Pellmyr, O. Plant-animal interactions: an evolutionary approach. Oxford: Blackwell Science, 2002.

## UNIT WEBPAGE, TECHNOLOGY USED AND REQUIRED

### Website

iLearn and email will be the principle method of communication in this subject. You will need stable access to the internet to access iLearn: <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.

We expect you to use iLearn to:

- Check subject announcements at least weekly
- Access weekly reading and videos
- Download or view lecture materials for revision
- Download laboratory materials
- Download reference materials
- Check your grades

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://students.mq.edu.au/support/health\\_and\\_wellbeing/disability\\_service/](http://students.mq.edu.au/support/health_and_wellbeing/disability_service/) 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).

## Unit Schedule

### Lecture topics\*\*

Lecture 1 - Tuesday 8am, 9 Wallys Walk (E6A) room 102

Lecture 2 - Thursday 1pm, 4 Western Rd (W5C) room 320

| Week | Date       | Time | Location                     | Lecture | Topic                                     | Lecturer       |
|------|------------|------|------------------------------|---------|---|----------------|
| 1    | 27/02/2018 | 8am  | 9 Wallys Walk (E6A) room 102 | 1       | Introduction– why we should study inverts | Kath McClellan |
|      | 1/03/2018  | 1pm  | 4 Western Rd (W5C) room 320  | 2       | Taxonomy and phylogenetics                | Kath McClellan |
| 2    | 6/03/2018  | 8am  | 9 Wallys Walk (E6A) room 102 | 3       | Invertebrate diversity I                  | Kath McClellan |

|    |            |     |                              |    |  |                         |
|----|------------|-----|------------------------------|----|--|-------------------------|
|    | 8/03/2018  | 1pm | 4 Western Rd (W5C) room 320  | 4  | Invertebrate diversity II                  | Kath McClellan          |
| 3  | 13/03/2018 | 8am | 9 Wallys Walk (E6A) room 102 | 5  | Invertebrate diversity III                 | Kath McClellan          |
|    | 15/03/2018 | 1pm | 4 Western Rd (W5C) room 320  | 6  | Invertebrate diversity IV                  | Kath McClellan          |
| 4  | 20/03/2018 | 8am | 9 Wallys Walk (E6A) room 102 | 7  | Invertebrate interactions I - Predation    | Kath McClellan          |
|    | 22/03/2018 | 1pm | 4 Western Rd (W5C) room 320  | 8  | Invertebrate interactions II - Herbivory   | Kath McClellan          |
| 5  | 27/03/2018 | 8am | 9 Wallys Walk (E6A) room 102 | 9  | Invertebrate interactions III - Parasitism | Kath McClellan          |
|    | 29/03/2018 | 1pm | 4 Western Rd (W5C) room 320  | 10 | Foraging                                   | Kath McClellan          |
| 6  | 3/04/2018  | 8am | 9 Wallys Walk (E6A) room 102 | 11 | Aquatic invertebrates                      | Kath McClellan          |
|    | 5/04/2018  | 1pm | 4 Western Rd (W5C) room 320  | 12 | Biomonitoring & bioindicators              | Kath McClellan          |
| 7  | 10/04/2018 | 8am | 9 Wallys Walk (E6A) room 102 | 13 | Eco Physiology                             | Ajay Narendra           |
|    | 12/04/2018 | 1pm | 4 Western Rd (W5C) room 320  | 14 | Navigation                                 | Ajay Narendra           |
|    |            |     |                              |    | Mid-session break                          |                         |
| 8  | 1/05/2018  | 8am | 9 Wallys Walk (E6A) room 102 | 15 | Communication I – Tactile & Audio          | Ajay Narendra           |
|    | 3/05/2018  | 1pm | 4 Western Rd (W5C) room 320  | 16 | Communication II – Chemo                   | Ajay Narendra           |
| 9  | 8/5/218    | 8am | 9 Wallys Walk (E6A) room 102 | 17 | Communication III – Vision                 | Ajay Narendra/Yuri      |
|    | 10/05/2018 | 1pm | 4 Western Rd (W5C) room 320  | 18 | Communication IV – Neurobiology            | Ajay Narendra/<br>Fanne |
| 10 | 15/05/2018 | 8am | 9 Wallys Walk (E6A) room 102 | 19 | Insect immunology                          | Fleur Ponton            |
|    | 17/05/2018 | 1pm | 4 Western Rd (W5C) room 320  | 20 | Insects in managed systems                 | TBA                     |
| 11 | 22/05/2018 | 8am | 9 Wallys Walk (E6A) room 102 | 21 | Reproduction and mating I                  | Mariella Herberstein    |
|    | 24/05/2018 | 1pm | 4 Western Rd (W5C) room 320  | 22 | Reproduction and mating II                 | Mariella Herberstein    |

|    |            |     |                              |    |                                |                |
|----|------------|-----|------------------------------|----|--------------------------------|----------------|
| 12 | 29/05/2018 | 8am | 9 Wallys Walk (E6A) room 102 | 23 | Invertebrates & climate change | Lesley Hughes  |
|    | 31/05/2018 | 1pm | 4 Western Rd (W5C) room 320  | 24 | Conservation issues            | Lesley Hughes  |
| 13 | 5/06/2018  | 8am | 9 Wallys Walk (E6A) room 102 | 25 | Exam outline and revision      | Kath McClellan |
|    | 7/06/2018  | 1pm | 4 Western Rd (W5C) room 320  | 26 | No lecture - revise for exam   |                |

\*\* Lecture topics may change to accommodate guest lectures schedules

### Internal practical schedule

Tuesday (9am-12pm or 2pm-5pm) E8A 160 and 120

| Week | Prac | Date       | Topic   |
|------|------|------------|---|
| 1    |      |            | No prac   |
| 2    | 1    | 6/03/2018  | Phylogenetics                                   |
| 3    | 2    | 13/03/2018 | Invertebrate diversity 1 – Garden invertebrates |
| 4    | 3    | 20/03/2018 | Invertebrate diversity 2 – Taxonomic key        |
| 5    | 4    | 27/03/2018 | Biodiversity sampling - Pitfall traps           |
| 6    | 5    | 3/04/2018  | Spider behaviour - territoriality               |
| 7    | 6    | 10/04/2018 | Navigation 1                                    |
|      |      |            | <b>Mid-session Break</b>                        |
| 8    | 7    | 1/05/2018  | Mid semester test &                             |
|      |      |            | Navigation 2                                    |
| 9    | 8    | 8/5/218    | Navigation 3                                    |
| 10   | 9    | 15/05/2018 | Immunology – fruit flies                        |
| 11   |      |            | No prac – private study for assessment          |
| 12   |      |            | No prac – private study for exam                |
| 13   |      |            | No prac – private study for exam                |

### External practical schedule – (9am-5pm) E8A 120

Session 1 (week 4): Saturday 23 March

Sessions 2-5 (mid-session break): Monday 23, Tuesday 24, Thursday 26 and Friday 27 April

| Date       | OCS | Topic   | Time |
|------------|-----|---|------|
| 24/03/2017 | 1   | Invertebrate diversity 1 – Garden invertebrates | 9-12 |
|            |     | Invertebrate diversity 2 – Taxonomic key        | 1-5  |
| 23/04/2017 | 2   | Phylogenetics                                   | 9-12 |
|            |     | Biodiversity sampling - Pitfall traps           | 1-5  |
| 24/04/2017 | 3   | Spider behaviour - territoriality               | 9-12 |
|            |     | Immunology – fruit flies                        | 1-5  |
| 26/04/2017 | 4   | Navigation 1                                    | 9-12 |
|            |     | Navigation 2                                    | 1-5  |
| 27/04/2017 | 5   | Mid-session test – prac report instructions     | 9-12 |
|            |     | Navigation 3 - analysis                         | 1-5  |

## 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) (<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) (<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) (<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 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](#).

### Special consideration / Disruptions to studies

If you have a serious and unavoidable disruption during your studies you can make an application for special consideration [Ask.mq.edu.au](http://ask.mq.edu.au) using the "Disruptions to Studies form." Disruptions need to be filed within 5 days of the disruption and have the correct supporting documentation. For more information on Disruptions to Studies notifications please refer to the university policy ([http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html)) and procedure ([http://www.mq.edu.au/policy/docs/disruption\\_studies/procedure.html](http://www.mq.edu.au/policy/docs/disruption_studies/procedure.html)).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

If you feel that you are not coping and could use some extra help or guidance, the Faculty of Science and Engineering has dedicated academic support officers to help you settle into studies and reach your full potential. If you are struggling and don't know where to turn for help, contact Helene or Michele (available for appointments on Tuesday, Wednesday, Thursday 10-3pm). Please contact them on 9850-8348, or email [sci.studentsupport@mq.edu.au](mailto:sci.studentsupport@mq.edu.au) or drop in to the FSE Student Centre and make an appointment to be called back.

Some pearls of wisdom:

- Don't take on too much work
- Don't leave things to the last minute
- If anything is not making sense, get help

For **Counselling, Disability and Student Advocacy Services** please contact [Campus Wellbeing](#)

g 9850 7497, Email: [campuswellbeing@mq.edu.au](mailto:campuswellbeing@mq.edu.au)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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 outcome

- Create hypotheses and design experiments to test those hypothesis by collecting appropriate data

#### Assessment tasks

- Scientific Journal Article
- Final exam

### 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

- Assess how adaptations of invertebrates influence species and community interactions,

and ecosystem function

- Create hypotheses and design experiments to test those hypothesis by collecting appropriate data
- Effectively communicate biological research findings and concepts to diverse audiences including scientists and the general public

## **Assessment tasks**

- Taxonomic Key
- Mid-Session Test
- Scientific Journal Article
- Final exam

## **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**

- Create hypotheses and design experiments to test those hypothesis by collecting appropriate data

## **Assessment tasks**

- Lecture Participation
- Scientific Journal Article
- Final exam

## **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

- Classify invertebrates into major taxonomic groups on the basis of morphological traits
- Identify morphological, behavioural, and physiological adaptations that allow invertebrates to survive in distinct habitats
- Assess how adaptations of invertebrates influence species and community interactions, and ecosystem function
- Create hypotheses and design experiments to test those hypothesis by collecting appropriate data
- Critically evaluate scientific hypotheses by statistically analysing data, and accurately interpreting results of those analyses

## Assessment tasks

- Lecture Participation
- Early assessment quiz
- Taxonomic Key
- Mid-Session Test
- Scientific Journal Article
- 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

- Identify morphological, behavioural, and physiological adaptations that allow invertebrates to survive in distinct habitats
- Assess how adaptations of invertebrates influence species and community interactions, and ecosystem function
- Create hypotheses and design experiments to test those hypothesis by collecting appropriate data
- Critically evaluate scientific hypotheses by statistically analysing data, and accurately interpreting results of those analyses
- Effectively communicate biological research findings and concepts to diverse audiences

including scientists and the general public

## **Assessment tasks**

- Early assessment quiz
- Taxonomic Key
- Mid-Session Test
- Scientific Journal Article
- 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**

- Create hypotheses and design experiments to test those hypothesis by collecting appropriate data
- Critically evaluate scientific hypotheses by statistically analysing data, and accurately interpreting results of those analyses
- Effectively communicate biological research findings and concepts to diverse audiences including scientists and the general public

## **Assessment tasks**

- Taxonomic Key
- Scientific Journal Article
- Final exam

## **Effective Communication**

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

### **Learning outcome**

- Effectively communicate biological research findings and concepts to diverse audiences

including scientists and the general public

## Assessment tasks

- Taxonomic Key
- Scientific Journal Article
- Final exam

## 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:

## Assessment tasks

- Scientific Journal Article
- Final exam

## Changes from Previous Offering

Lecture participation.

## Changes since First Published

| Date       | Description   |
|------------|---|
| 12/02/2018 | Corrected due-date year.  |
| 23/01/2018 | Updated Special Considerations Policy, Supplementary Exams Policy and lecture schedule. |