



# BIOL2610

## Biological Data Analysis

Session 1, In person-scheduled-weekday, North Ryde 2022

*School of Natural Sciences*

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#### **Disclaimer**

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## General Information

### Unit convenor and teaching staff

Convenor

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### Credit points

10

### Prerequisites

40cp at 1000 level or above including (((STAT1170 or STAT170(P)) or (STAT1250 or STAT150) or (STAT1371 or STAT171) or FOSE1015) and (10cp(P) in BBE or BIOL units))

### Corequisites

### Co-badged status

BIOL6610 BIOX2610

### Unit description

Biological organisms are inherently variable, which means that practicing biologists need a solid grasp of how to design and implement experiments, perform statistical analyses on the resulting data, and correctly interpret the results of statistical tests. This unit provides a foundation in the principles of experimental design and data analysis for biology. The unit is taught by biology staff and draws on research carried out in the Department of Biological Sciences. Students also learn the overall process of asking and answering questions in biology. Students learn a range of common data analysis techniques, and how to interpret the outcomes of these analyses. There is a strong emphasis on critically evaluating biological studies and identifying sound conclusions and not-so-sound conclusions. This unit is strongly recommended for students planning a career in biology or environmental science.

## 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:

**ULO1:** Develop testable hypotheses from general scientific questions

**ULO2:** Design an unconfounded experiment to test a given scientific hypothesis

**ULO3:** Choose an appropriate statistical test to analyse experimental data

**ULO4:** Carry out and correctly interpret a range of commonly used statistical tests using the computer package R

**ULO5:** Clearly present outcomes of statistical analyses using figures, tables and text

**ULO6:** Critically evaluate other studies with respect to experimental design and the application and interpretation of statistics

## **General Assessment Information**

### **General Faculty Policy on assessment submission deadlines and late submissions:**

Online quizzes, in-class activities, or scheduled tests and exams must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date. Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark of zero, except the Experiment Report, which can be submitted late. The penalty for late submissions will be applied as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

### **Off-shore students**

Off-shore students must email the convenor as soon as possible to discuss study options.

### **COVID Information and on-campus classes**

On-campus teaching continues to be scheduled for Session 1, 2022. Masks are compulsory for all classes in indoor spaces and social distancing will be implemented wherever possible. Students will also be required to sanitise surfaces before and after use.

Students are requested to minimise the risk of spreading COVID to themselves and others in accordance with the university and NSW Health guidelines: <https://www.mq.edu.au/about/coronavirus-faqs> and <https://www.nsw.gov.au/covid-19/stay-safe>.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Exam of Basic Stats Knowledge</a>	5%	Yes	Week 3
<a href="#">Weekly Practical</a>	0%	Yes	Weekly starting in Week 1
<a href="#">Weekly Quiz</a>	15%	No	Weekly starting in Week 1
<a href="#">Experiment Report</a>	20%	No	Friday May 27, 5pm
<a href="#">Mid-semester Exam</a>	15%	No	Week 8
<a href="#">Final Exam</a>	45%	No	Exam Period

### Exam of Basic Stats Knowledge

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 1 hours

Due: **Week 3**

Weighting: **5%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

You will be tested on your knowledge of basic statistical concepts and skills taught in the statistics prerequisite for this unit. The test will be delivered as an online quiz through iLearn.

On successful completion you will be able to:

- Choose an appropriate statistical test to analyse experimental data

### Weekly Practical

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Weekly starting in Week 1**

Weighting: **0%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

In practicals, you will learning how carry out a variety of statistical analyses to address biological hypotheses, and how to interpret the results of statistical analyses in light of these hypotheses.

On successful completion you will be able to:

- Carry out and correctly interpret a range of commonly used statistical tests using the computer package R

## Weekly Quiz

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 26 hours

Due: **Weekly starting in Week 1**

Weighting: **15%**

Every week there will be an online quiz with example problems to complete. These problems will be based on lectures and practicals. They will allow you to practice interpreting the results of statistical analyses, and applying the concepts and methods you have learned. It is strongly recommended that you make a serious effort to complete these quizzes.

On successful completion you will be able to:

- Choose an appropriate statistical test to analyse experimental data
- Carry out and correctly interpret a range of commonly used statistical tests using the computer package R
- Clearly present outcomes of statistical analyses using figures, tables and text

## Experiment Report

Assessment Type <sup>1</sup>: Report

Indicative Time on Task <sup>2</sup>: 30 hours

Due: **Friday May 27, 5pm**

Weighting: **20%**

You will design, conduct and analyse data for an experiment of your own. You will be given a range of alternative experimental questions to choose from. You will need to pick a question, design and carry out an experiment addressing that question, then write up the results in the form of the methods and results sections of a scientific paper.

On successful completion you will be able to:

- Develop testable hypotheses from general scientific questions
- Design an unconfounded experiment to test a given scientific hypothesis
- Choose an appropriate statistical test to analyse experimental data
- Carry out and correctly interpret a range of commonly used statistical tests using the computer package R
- Clearly present outcomes of statistical analyses using figures, tables and text
- Critically evaluate other studies with respect to experimental design and the application and interpretation of statistics

## Mid-semester Exam

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 1 hours

Due: **Week 8**

Weighting: **15%**

You will be tested on your knowledge of lecture material for weeks 1 to 6 in Week 8 (following semester break). This test will be delivered as an online assignment accessible through iLearn. Skills you will be tested on include identifying the appropriate statistical test given a dataset and hypothesis, correctly interpreting statistical output produced by R, and critically evaluating the experimental designs and statistics of previous studies.

On successful completion you will be able to:

- Choose an appropriate statistical test to analyse experimental data
- Carry out and correctly interpret a range of commonly used statistical tests using the computer package R
- Critically evaluate other studies with respect to experimental design and the application and interpretation of statistics

## Final Exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 2 hours

Due: **Exam Period**

Weighting: **45%**

The final exam will be held during the Semester 1 Exam Period and will be 2 hr (plus 10 min reading time). Please consult the University Handbook to determine the commencement and

finishing dates of the compulsory exam period. Skills you will be tested on include identifying the appropriate statistical test given a dataset and hypothesis, correctly interpreting statistical output produced by R, and critically evaluating the experimental designs and statistics of previous studies.

On successful completion you will be able to:

- Choose an appropriate statistical test to analyse experimental data
- Carry out and correctly interpret a range of commonly used statistical tests using the computer package R
- Critically evaluate other studies with respect to experimental design and the application and interpretation of statistics

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## **Delivery and Resources**

### **TO PASS THIS UNIT YOU MUST:**

- Achieve a total mark of at least 50%.
- Achieve a mark of at least 50% on the exam of basic stats knowledge. This is a hurdle requirement.
- Attend and participate in at least 8 of the practicals. This is a hurdle requirement.

### **Lectures**

There are two one-hour lectures per week. Lectures will take place on campus. You are encouraged to attend these lectures live so they can ask questions, but recordings will also be made available on iLearn. You are expected to listen to all of the lectures.

### **Practicals**

Practicals last 2 hours each and are conducted on campus and online. You are expected to attend and participate in practical sessions, as they are a hurdle requirement of the unit. Failure

to attend and complete at least 8 of the practicals will result in a fail grade.

## **iLearn**

The primary means of communication for this unit is via iLearn, which can be accessed by most web browsers from inside or outside the University. You are expected to use iLearn for:

- Doing the Weekly Quizzes
- Regularly checking announcements
- Discussing the unit and its content with staff and other students
- Downloading Lecture and Practical materials
- Downloading reference materials

### *Logging in to iLearn*

- The iLearn login page is: <https://ilearn.mq.edu.au/>
- Username: your student number
- Problems? Please contact Student IT Help
- Need extra help due to a disability/health condition? Please visit the Student Services Website : <https://students.mq.edu.au/support/wellbeing>

## **Missed Practicals**

If you know you will miss a practical, or if you have already missed one, please email the convenor at [biol2610@mq.edu.au](mailto:biol2610@mq.edu.au). There may be alternative practical slots, including the internal sessions, available for you to catch up.

## **Overall grades**

The University grading is: fail (F <50%), pass (P 50%-64%), credit (CR 65%-74%), distinction (D 75%-84%) and high distinction (HD 85%-100%).

## **Exam Special Consideration**

If you apply for Special Consideration for your final examination, you must make yourself available for the alternative examination period. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

## **Assignment submission, Turnitin and Plagiarism**

This is a paperless unit, so no paper submission will be required for your written report, which will



be submitted through iLearn via a Turnitin link. Your written assignment will be checked for plagiarism using Turnitin. Plagiarism will not be tolerated. Do not under any circumstances lend your work to another student. If that student plagiarises your work, you too may be liable. The penalties imposed by the University for plagiarism are serious and may include expulsion from the University. A full outline of the Universities policy on plagiarism is found at [http://www.mq.edu.au/policy/doc\\_s/academic\\_honesty/policy.html](http://www.mq.edu.au/policy/doc_s/academic_honesty/policy.html).

## **RESOURCES and SUPPORT**

How to find the answers

1. Please read the unit outline.
2. Consult iLearn - often your question has already been asked and answered by another student.
3. If the answer to a question will benefit others, please post it on iLearn.
4. Unexpected adjustments made during the unit will announced via announcements, so make sure you check iLearn regularly.

## **EMAIL PROTOCOL**

1. Always submit questions to [biol2610@mq.edu.au](mailto:biol2610@mq.edu.au).
2. Please be courteous and patient - we will endeavour to reply to your email within 24 hours. Responses will be delayed during weekends.

## **Text Book**

There are no required textbooks for the unit, but Steve McKillup's book "Statistics Explained : An Introductory Guide for Life Scientists" is highly recommended. Copies of the book are available online and on reserve in the Macquarie University library.

## **OTHER HELP**

The Numeracy Centre offers drop-in sessions to students with statistical questions. It is located at 14 Sir Christopher Ondaatje Avenue, Room 188. For questions and scheduling, please visit the iLearn page.

## **Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). 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](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

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

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)

- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## 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.