



# BIOL2610

## Biological Data Analysis

Session 1, Special circumstances 2021

*Archive (Pre-2022) - Department of Biological Sciences*

### Contents

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<a href="#">General Information</a>	2
<a href="#">Learning Outcomes</a>	2
<a href="#">General Assessment Information</a>	3
<a href="#">Assessment Tasks</a>	3
<a href="#">Delivery and Resources</a>	7
<a href="#">Policies and Procedures</a>	9
<a href="#">Changes since First Published</a>	11

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#### Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

#### Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

## General Information

Unit convenor and teaching staff

Associate Professor

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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

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

### Academic Honesty – please read, as this is very important

Presenting the work of another person as one's own is a serious breach of the University's rules and carries significant penalties. The University's Academic Honesty Policy can be found at [http://www.mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://www.mq.edu.au/policy/docs/academic_honesty/policy.html)

In this unit, we will be checking written work for plagiarism using TURNITIN. Penalties for plagiarism may include a zero mark for the assignment or in more extreme cases, failure of the unit. Plagiarism WILL be noted on your academic record. Full details of penalties can be found at [http://www.mq.edu.au/policy/docs/academic\\_honesty/schedule\\_penalties.html](http://www.mq.edu.au/policy/docs/academic_honesty/schedule_penalties.html)

### Extensions, penalties and disruptions to studies

Late assignments will attract a penalty of **5%** of the total marks allocated to the exercise per day. You may hand in your work after the due date and escape penalty only if you have an acceptable reason (usually a medical certificate). Discuss your problem with the Lecturer as early as possible before the due date, however note that all requests for extensions MUST be submitted using the online form: [ask.mq.edu.au](http://ask.mq.edu.au).

Information about the Disruptions to Studies policy and procedure is online at Policy Central: [http://www.mq.edu.au/policy/docs/disruption\\_studies/procedure.html](http://www.mq.edu.au/policy/docs/disruption_studies/procedure.html).

Information on managing your Disruptions to Studies: [http://students.mq.edu.au/student\\_admin/manage\\_your\\_study\\_program/disruption\\_to\\_studies/](http://students.mq.edu.au/student_admin/manage_your_study_program/disruption_to_studies/)

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Mid-semester Exam</a>	15%	No	Week 8
<a href="#">Final Exam</a>	45%	No	Final Exam Period
<a href="#">Weekly Practical</a>	0%	Yes	Weekly

Name	Weighting	Hurdle	Due
<a href="#"><u>Experiment Report</u></a>	20%	No	Friday May 28, 5pm
<a href="#"><u>Weekly Quiz</u></a>	15%	No	Open Weekly, Friday 5pm, for a period of 1 week
<a href="#"><u>Exam of Basic Stats Knowledge</u></a>	5%	Yes	Week 3

## 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: **Final 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

## Weekly Practical

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

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

Due: **Weekly**

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

## Experiment Report

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

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

Due: **Friday May 28, 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

## Weekly Quiz

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

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

Due: **Open Weekly, Friday 5pm, for a period of 1 week**

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

## 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
- 

<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. This year, lectures will take place on Zoom via live stream. Links will be made available on iLearn. Students 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. Note that 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. We expect you 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 from mid July to the end of July, 2021. 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).



## Extensions and penalties

5% will be deducted for each day your experiment report is late. If you are unable to submit the assignment by the due date, then an extension must be sought before the due date unless this is impossible. To support your extension, you will be asked to submit a special consideration request via [ask.mq.edu.au](https://ask.mq.edu.au).

## 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.

## 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 (<https://ilearn.mq.edu.au/enrol/index.php?id=30577>).

## 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](https://policies.mq.edu.au)

- [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](#)

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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@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](https://mq.edu.au/learningskills)) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [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

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)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@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.

## Changes since First Published

Date	Description
09/02/2021	Noted that exam of basic stats knowledge is hurdle.