



BIOL2110

Genetics

Session 1, Weekday attendance, North Ryde 2021

Department of Biological Sciences

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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

Rachael Dudaniec

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Credit points

10

Prerequisites

(BIOL1110 or BIOL115) and ((BIOL1310 or BIOL114) or (BIOL1210 or BIOL108) or (BIOL1610 or BIOL116) or (BIOL1620))

Corequisites

(STAT1170 or STAT170) or (STAT1371 or STAT171) or FOSE1015

Co-badged status

BIOL6110

Unit description

Genetics occupies a central role in modern sciences, with profound implications for basic and applied research in biology, medicine and agriculture, as well as for a number of philosophical issues in human affairs. This unit offers a balanced approach to teach introductory principles of genetics. It combines sections on classical, molecular and population genetics presented in an integrative way. The practical sessions offer students the possibility of learning essential techniques and skills in modern molecular genetics.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://students.mq.edu.au/important-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Describe how genetic processes apply to agriculture, human health, society, and the environment

ULO2: Apply numeracy and basic principles of genetics to solve problems and draw conclusions from genetic data

ULO3: Describe routine techniques used to assay genetic variation in populations

ULO4: Demonstrate proficiency in the use of genetic research tools (pipettes, gel

electrophoresis, sequence analysis)

ULO5: Analyse genetic data using some common population genetic software and bioinformatic tools

ULO6: Source, synthesise and critically evaluate information from the literature in written and oral formats

Assessment Tasks

| Name | Weighting | Hurdle | Due |
|----------------------------------|-----------|--------|-------------|
| Final Exam | 45% | Yes | Exam Period |
| Problem Sets | 5% | No | 3,4,6,8,9 |
| Practical Report | 25% | No | April 12 |
| Seminar Poster | 15% | No | April 19 |
| Test | 10% | No | May 14 |

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 25 hours

Due: **Exam Period**

Weighting: **45%**

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

Students will be tested on their knowledge of course content. The exam will include information from lectures, practical classes and assessment tasks up to and including week 13. The date for your final exam will be available later in the semester.

On successful completion you will be able to:

- Describe how genetic processes apply to agriculture, human health, society, and the environment
- Apply numeracy and basic principles of genetics to solve problems and draw conclusions from genetic data
- Describe routine techniques used to assay genetic variation in populations

Problem Sets

Assessment Type ¹: Problem set

Indicative Time on Task ²: 10 hours

Due: **3,4,6,8,9**

Weighting: **5%**

The problem sets are designed to assist you to understand topics covered in the course and to provide you with feedback on your understanding of those topics. It is essential that you complete the problem sets as the test and the final examination will cover similar topics to the problems. Answers to the problem sets will be provided. A good and reasonable attempt at each of the problem sets is required to obtain the full marks for each problem set (problems will not be individually graded).

On successful completion you will be able to:

- Apply numeracy and basic principles of genetics to solve problems and draw conclusions from genetic data
- Analyse genetic data using some common population genetic software and bioinformatic tools

Practical Report

Assessment Type ¹: Report

Indicative Time on Task ²: 20 hours

Due: **April 12**

Weighting: **25%**

A major component of this unit is the preparation of a practical report. This practical report should be presented in the style of a scientific publication and describe the procedures and results from the first two practical sessions. It is recommended that you start drafting your report at the commencement of the first practical session. In these practical sessions you will learn essential skills, including: how to isolate DNA, visualize DNA using gel electrophoresis, perform PCR amplification, and sequence a mitochondrial gene. You will learn to identify unknown DNA samples by comparing their sequences with those available in DNA sequence databases. After this, you will align all the DNA sequences collected and build a phylogenetic tree as a complementary method for species identification. Your report will include the activities undertaken within Practicals 1 and 2 within a scientific paper format, with Introduction, Methods, Results and Discussion.

On successful completion you will be able to:

- Describe how genetic processes apply to agriculture, human health, society, and the environment
- Demonstrate proficiency in the use of genetic research tools (pipettes, gel electrophoresis, sequence analysis)
- Analyse genetic data using some common population genetic software and bioinformatic tools
- Source, synthesise and critically evaluate information from the literature in written and oral formats

Seminar Poster

Assessment Type ¹: Presentation

Indicative Time on Task ²: 10 hours

Due: **April 19**

Weighting: **15%**

You are required to design and present a 3-minute scientific conference poster (design as a powerpoint slide) to your tutorial group on **a topic in genetics** that you find exciting, based on a peer-reviewed scientific paper. Further instructions on designing your poster are provided on iLearn and in practical sessions. The grade of your poster assessment will be based on content and presentation and involves peer evaluation.

On successful completion you will be able to:

- Describe how genetic processes apply to agriculture, human health, society, and the environment
- Describe routine techniques used to assay genetic variation in populations
- Source, synthesise and critically evaluate information from the literature in written and oral formats

Test

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 10 hours

Due: **May 14**

Weighting: **10%**

Your progress during the unit will be assessed with a test that will focus on topics covered during

the lectures and practical sessions. This test will require application of genetic principles to solve problems and an ability to describe genetic processes and techniques.

On successful completion you will be able to:

- Describe how genetic processes apply to agriculture, human health, society, and the environment
- Apply numeracy and basic principles of genetics to solve problems and draw conclusions from genetic data
- Describe routine techniques used to assay genetic variation in populations

¹ 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 [Learning Skills Unit](#) for academic skills support.

² 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

Unit Text Book

- **Peirce (2017). Genetics: A conceptual Approach (6th Edition). W.H. Freeman and Company, New York.**

Unit Schedule

Online Lecture Schedule 2021

This unit has two lectures per week Lectures will be made available at the start of each week. Week 1 commences February 22, 2021.

| <u>Lecture</u> | <u>Week</u> | <u>Topic</u> |
|----------------|-------------|---|
| 1 | 1 | Unit Introduction and Basic Revision |
| 2 | 1 | Basic Revision 2: Sex and Reproduction |
| 3 | 2 | Mendelian Genetics |
| 4 | 2 | Sex Determination Patterns of Inheritance |
| 5 | 3 | Allelic variation and gene function |

| | | |
|----|----|--|
| 6 | 3 | Linkage and Crossing Over |
| 7 | 4 | Chromosome Number and Structure |
| 8 | 4 | DNA Replication and Synthesis |
| 9 | 5 | Transcription and Translation |
| 10 | 5 | Gene Expression, Mutation and DNA Repair |
| 11 | 6 | Molecular Techniques I |
| 12 | 6 | Molecular Techniques II |
| 13 | 7 | Population Genetics |
| 14 | 7 | Inbreeding and Inbreeding Depression |
| 15 | 8 | Epigenetics |
| 16 | 8 | Evolutionary Genetics |
| 17 | 9 | Quantitative Genetics |
| 18 | 9 | Conservation Genetics |
| 19 | 10 | Genetic Response to Change |
| 20 | 10 | Human Genetics |
| 21 | 11 | Technological Advances and Applications |
| 22 | 11 | Revision 1 |
| 23 | 12 | Revision 2 |

Internal Practical Schedule

On- campus practical sessions will run on Thursdays and Fridays during your allocated practical slot in either E8A 120 or E8A 160. Please attend your assigned slot. Online practical session materials will be made available at the commencement of the week it is held.

| <u>Week</u> | <u>Date</u> | <u>Practical/Tutorial</u> |
|-------------|---------------------------|--|
| 1 | 25 & 26 Feb | NO PRACTICAL/TUTORIAL |
| 2 | 4 & 5 March | DNA Extraction and PCR |
| 3 | 11 & 12 March | DNA Sequence Alignment and Data Analysis |
| 4 | <i>ONLINE 18-19 March</i> | <i>Hardy-Weinberg Equilibrium – single locus</i> |
| 5 | 25 & 26 March | Hardy-Weinberg Equilibrium – population level |

| | | |
|---------------------------|------------------|----------------------------------|
| 6 | ONLINE 1-2 April | Data Quality in Genomics |
| Mid Semester Break | | |
| 7 | 22 & 23 April | Poster Presentations – session 1 |
| 8 | 29 & 30 April | Poster Presentations – session 2 |
| 9 | ONLINE 6-7 May | Revision for Test |
| 10 | ONLINE 13-14 May | Test |
| 11 | 20 & 21 May | Test answers and exam revision |
| 12 | 27 & 28 May | NO PRACTICAL/TUTORIAL |

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](#)
- [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 or if you are a Global MBA

student contact 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) 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 Enquiry Service

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

Equity 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.

IT Help

For help with University computer systems and technology, visit 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 from Previous Offering

Assessment weightings have been modified

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 [htt](#)

[p://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

Extensions, penalties and disruptions to studies

Late assignments will attract a penalty of **10%** 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.

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.

Information on managing your Disruptions to Studies: http://students.mq.edu.au/student_admin/manage_your_study_program/disruption_to_studies/