



Faculty of Science, Engineering and Built Environment

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**SLE254 Genetics and Genomics**

**Deakin University Unit Guide**

Trimester 2, 2024

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## Welcome

The basic principles of genetics will be examined in this unit and topics covered will span the basis of heredity through to evolution and genetic diversity. This unit will cover Mendelian genetics, chromosomal structure, mutation and DNA repair, sex determination, the Hardy-Weinberg principle, recombination, linkage and disequilibrium, natural selection, genetic drift, and inbreeding and non-random mating. Additionally, students will develop laboratory techniques/skills relevant to researching genetics, in a group environment, and ascertain how research projects are undertaken in this discipline. This Unit Guide provides you with the key information about this unit. Please read it carefully and refer to it frequently throughout the study period. Your unit site also provides information about your rights and responsibilities. We will assume you have read this before the unit commences, and we expect you to refer to it throughout the study period.

To be successful in this unit, you must:

- read all materials in preparation for your learning activities and follow up each with further study and research on the topic
- start your assessment tasks well ahead of the due date
- read or listen to all feedback carefully and use it in your future work
- attend and engage in all educator facilitated (scheduled) learning activities and other learning experiences as part of the unit design

## Who is the unit team?

**Unit chair: leads the teaching team and is responsible for overall delivery of this unit**

Marina Telonis-Scott

### Unit chair details

**Name:** Dr Marina Telonis-Scott

**Campus:** Melbourne Burwood

**Email:** [m.telonisscott@deakin.edu.au](mailto:m.telonisscott@deakin.edu.au)

**Phone:** +61 3 924 46455

### Other members of the team and how to contact them

Geelong Waurn Ponds Campus Leader: contact the campus leader for assistance at your campus

**Name:** Dr Andrew Oxley

**Email:** [andrew.oxley@deakin.edu.au](mailto:andrew.oxley@deakin.edu.au)

**Phone:** + 61 3 522 73670

### Administrative queries

- check-out the 'SEBE Student Hub' section on your unit site
- contact your Unit Chair or Campus Leader
- drop in or contact [Student Central](#) to speak with a Student Adviser

For additional support information, please see the Rights and Responsibilities section under 'Content' in your unit site.

## About this unit

### Unit development in response to student feedback

Every trimester, we ask students to tell us, through eVALUate, what helped and hindered their learning in each unit. You are strongly encouraged to provide constructive feedback for this unit when eVALUate opens (you will be emailed a link). In previous versions of this unit, students have told us that these aspects of the Unit have helped them to achieve the learning outcomes:

- Students found the lectures, practicals and the quality of teaching all helpful in this unit.
- The learning resources were very helpful.

- The practical component of the unit helped in students' understanding of how ideas relate to practical concepts.
- The streamlined unit material with more focus on foundational concepts such as recombinant DNA technology and latest advances in molecular biology.

The following aspects of the unit have been introduced, enhanced or retained in response to feedback from students who have undertaken this unit in previous trimesters:

- Clearer assessment resources to assist students writing up the practical poster.
- More challenging mid-trimester test problem solving questions.

If you have any concerns about the unit during the trimester, please contact the unit teaching team - preferably early in the trimester - so we can discuss your concerns, and make adjustments, if appropriate.

### Your Unit Learning Outcomes

Each unit in your course is a building block towards Deakin's Graduate Learning Outcomes - not all units develop and assess every Graduate Learning Outcome (GLO).

ULO	These are the Learning Outcomes (ULO) for this unit. At the completion of this unit, successful students can:	<a href="#">Deakin Graduate Learning Outcomes</a>
ULO1	Develop in-depth comprehension of how genetics underpins the basis of heredity evolution, and diversity.	GLO1: Discipline-specific knowledge and capabilities GLO2: Communication GLO6: Self-management
ULO2	Demonstrate critical thinking and problem solving skills.	GLO4: Critical thinking GLO5: Problem solving
ULO3	Generate and analyse experimental data using genetic techniques, in a small group setting, and applied principles of scientific report writing.	GLO1: Discipline-specific knowledge and capabilities GLO2: Communication GLO4: Critical thinking

### Assessing your achievement of the unit learning outcomes

#### Summative assessment (tasks that will be graded or marked)

NOTE: It is your responsibility to keep a backup copy of every assignment and the materials used to develop/complete it where possible (e.g. written/digital reports, essays, videos, images). In the unusual event that one of your submissions becomes corrupted, is incorrectly submitted or otherwise lost, you *may* be asked to submit the backup copy. Any work you submit may be checked by electronic or other means for the purposes of detecting breaches of academic integrity such as collusion, plagiarism and contract cheating. You must understand your responsibility to act with honesty and integrity in your studies as Deakin takes all breaches very seriously. Make sure you read [Your rights and responsibilities as a student in this unit](#) to find out more about academic integrity.

Deakin has a universal assessment submission time of 8pm AEDT/AEST. A late penalty will apply to assessments submitted after 11.59pm AEDT/AEST.

#### - Summative assessment task 1

Details	Practical projects
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<b>Brief description of assessment task</b>	This task requires students to perform genetics-related experimentation during practical sessions. Students will be required to precisely implement molecular genetics experimental procedure, apply genetics principals and use scientific instrumentation to generate data and make experimental observations Assessment will be based on the online practical quiz (Cat practical, practical 1) and final poster format report (Chicken practicals 2-4).
<b>Detail of student output</b>	This is an individual task. However, students are allowed to work in small groups during practical sessions to generate and analyse experimental data using molecular genetic techniques. They are expected to individually author the quiz and poster on practical activities, results and implications.
<b>Grading and weighting</b> (% total mark for unit)	40% - marked (quiz 8%; report in poster format 32%)
<b>This task assesses your achievement of these Unit Learning Outcome(s)</b>	<b>ULO3</b> Quiz and poster will assess whether student have generated and analysed experimental data using molecular genetic techniques, and applied principles of scientific report writing. The quiz and report will assess whether the student attained information from recommended electronic databases for use in practical analysis and scientific report writing.
<b>This task assesses your achievement of these Graduate Learning Outcome(s)</b>	<b>GLO1:</b> through student ability to provided evidence of <i>fundamental knowledge</i> of genetics relating to experimental study. <b>GLO2:</b> through student ability to use written scientific communication to inform and provided evidence of <i>fundamental knowledge</i> of Human Genetics relating to the practical theory and practice studied. <b>GLO4:</b> through student ability to apply analytical and logical reasoning to analyse and interpret practical theory and practice information. <b>GLO6:</b> through student ability to author a quiz and report on practical activities, results and implications.
<b>How and when you will receive feedback on your work</b>	Quiz and report (poster) will be corrected and returned with feedback within two-three weeks of submission.
<b>When and how to submit your work</b>	Your practical quiz and poster report are to be submitted electronically via the unit site. The quiz will be available from Monday 15 July until 26 July 2024, Week 3 Poster report due by 8pm Week 10, Friday 20 September 2024

- Summative assessment task 2

<b>Details</b>	<b>Online test 1</b>
<b>Brief description of assessment task</b>	The online test will require students to demonstrate knowledge of genetics by analysing and interpreting questions relating to the basis of heredity, evolution and diversity.
<b>Detail of student output</b>	This is an individual task. Students will be required to answer multiple choice and short answer questions relating to content covered in Weeks 1-4. The 50-minute test will be in quiz format accessed on the unit site.
<b>Grading and weighting</b> (% total mark for unit)	10% - marked
<b>This task assesses your achievement of these Unit Learning Outcome(s)</b>	<b>ULO1</b> Class Test will assess whether students have <u>developed</u> in-depth comprehension of how genetics underpins the basis of heredity, evolution, and diversity. <b>ULO2</b> Class Test will assess critical thinking and problem solving skills. Students will need to <u>evaluate</u> and <u>interpret</u> the questions and <u>demonstrate</u> understanding of the problem.

<b>This task assesses your achievement of these Graduate Learning Outcome(s)</b>	<p><b>GLO1:</b> through student ability to provide evidence of <i>fundamental knowledge</i> of genetics relating to the principles of heredity, evolution and diversity examined.</p> <p><b>GLO2:</b> through student ability to use written scientific communication to inform and provided evidence of <i>fundamental knowledge</i> of genetics relating to the principles of heredity, evolution and diversity examined.</p> <p><b>GLO4:</b> through student ability to analyse case study information and through interpretation of this information, and through the use of abstract and logical reasoning, answer pertinent questions.</p> <p><b>GLO5:</b> through student ability to calculate answers, interpret questions and demonstrate integrated understanding of the problems.</p>
<b>How and when you will receive feedback on your work</b>	Marks will be provided to students within 1-2 weeks of completing the test. Students can contact the lecturer with specific questions regarding the test to get feedback.
<b>When and how to submit your work</b>	The online test opens at 9am Tuesday August 6 and closes at 9am Wednesday August 7 Week 5 of trimester. Online submission via the unit site.

- Summative assessment task 3

<b>Details</b>	<b>Online test 2</b>
<b>Brief description of assessment task</b>	The second online test will require students to demonstrate knowledge of genetics by analysing and interpreting questions relating to the basis of heredity, evolution and diversity.
<b>Detail of student output</b>	This is an individual task. Students will be required to answer multiple choice and short answer questions relating to content covered in Weeks 5-8. The 50-minute test will be in quiz format accessed on the unit site.
<b>Grading and weighting (% total mark for unit)</b>	10% - marked
<b>This task assesses your achievement of these Unit Learning Outcome(s)</b>	<p><b>ULO1</b> Class Test will assess whether students have <u>developed</u> in-depth comprehension of how genetics underpins the basis of heredity, evolution, and diversity.</p> <p><b>ULO2</b> Class Test will assess critical thinking and problem solving skills. Students will need to <u>evaluate</u> and <u>interpret</u> the questions and <u>demonstrate</u> understanding of the problem.</p>
<b>This task assesses your achievement of these Graduate Learning Outcome(s)</b>	<p><b>GLO1:</b> through student ability to provide evidence of <i>fundamental knowledge</i> of genetics relating to the principles of heredity, evolution and diversity examined.</p> <p><b>GLO2:</b> through student ability to use written scientific communication to inform and provided evidence of <i>fundamental knowledge</i> of genetics relating to the principles of heredity, evolution and diversity examined.</p> <p><b>GLO4:</b> through student ability to analyse case study information and through interpretation of this information, and through the use of abstract and logical reasoning, answer pertinent questions.</p> <p><b>GLO5:</b> through student ability to calculate answers, interpret questions and demonstrate integrated understanding of the problems.</p>
<b>How and when you will receive feedback on your work</b>	Marks will be provided to students within 1-2 weeks of completing the test. Students can contact the lecturer with specific questions regarding the test to get feedback.
<b>When and how to submit your work</b>	The online test opens at 9am Tuesday September 10 and closes at 9am Wednesday September 11 Week 9 of trimester. Online submission via the unit site.

- Summative assessment task End-of-unit assessment or Examination

<b>Details</b>	<b>End-of-unit assessment - Written</b>
<b>Brief description of assessment task</b>	The final assessment will be an online assessment based on lecture and practical material. This is an individual assessment task.

<b>How you demonstrate your achievement</b>	Students will complete a 2-hour written assessment synthesising their understanding of the unit via problem solving scenarios. A written assessment is a form of assessment that asks you to use text to communicate your knowledge, skill or understanding of a topic. It is completed online. At a set release time, you will be given the assessment instructions and will complete the assessment by a set deadline.
<b>Grading and weighting (% total mark for unit)</b>	40%
<b>This task assesses your achievement of these Unit Learning Outcome(s)</b>	<b>ULO1</b> Final assessment will assess whether students have <u>developed</u> in-depth comprehension of how genetics underpins the basis of heredity, evolution, and diversity. <b>ULO2</b> Final assessment will assess critical thinking and problem solving skills. Students will need to <u>evaluate</u> and <u>interpret</u> the questions and <u>demonstrate</u> understanding of the problem.
<b>This task assesses your achievement of these Graduate Learning Outcome(s)</b>	<b>GLO1:</b> through student ability to provide evidence of <i>fundamental knowledge</i> of genetics relating to the principles of heredity, evolution and diversity examined. <b>GLO4:</b> through student ability to analyse case study information and through interpretation of this information, and through the use of abstract and logical reasoning, answer pertinent questions. <b>GLO5:</b> through student ability to calculate answers, interpret questions and demonstrate integrated understanding of the problems.
<b>How and when you will receive feedback on your work</b>	Where practicable the Unit Chair will provide general feedback on the assessment task via the Unit site in a timely manner. Students can also request individual feedback on their end-of-unit assessment within 10 University working days from receiving their mark.
<b>When and how to submit your work</b>	Students will be required to undertake a timed online assessment during the end-of-unit assessment period.  You will start and complete at any time within a scheduled 24-hour window, with a 2-hour time limit.  Further details will be provided on the unit site.  It is the responsibility of students to review their end-of-unit assessment timetable when it is released via StudentConnect.  Further information including timetable release dates is available at <a href="#">end-of-unit assessments and examinations</a> .

### Your learning experiences in this Unit - and your expected commitment

#### Typical study commitment

Students will on average spend 150 hours over the teaching period undertaking the teaching, learning and assessment activities for this unit.

**This will include educator guided online learning activities within the unit site.**

**Educator-facilitated (scheduled) learning activities - on-campus unit enrolment**

3 x 1 hour online lectures per week, 4 x 3 hour practical experience (laboratory) per trimester.

Learning and assessment activity includes online lecture time, designated activities in the practical sessions, assessment tasks, readings and study time. Preparing practical reports take a considerable amount of time. Students should allow at least 3-5 hours following practical sessions for completing the required analyses for reporting.

This genetics unit will be taught online through live virtual lectures and on-campus practical sessions and through resources available via the unit site (e.g. practice questions, journal references, web links to relevant topics/websites). Unit materials

will be available for download from the unit site. All materials will be found within folders located on the SLE254 homepage. Lecture notes have been designed to guide and supplement the lecture and your reading of the textbook. Video clips will be provided to enhance the lecture material and provide problem-solving instructions, as well as to demonstrate step by the step the genetic techniques used in the unit.

The on-campus practical class provide opportunities for you to engage in some of the important techniques and concepts that are commonly used to understand genetics. Attendance at each of the on-campus practicals and submission of practical reports is compulsory. All information about practicals, including the timetable and practical manuals, can be found on the unit site. You should download the practical worksheets for each practical.

#### **Note**

At Deakin, courses are delivered within a learning environment that provides all students with equitable and consistent access to facilities, infrastructure, resources, and support to assist student progress and achievement of learning outcomes.

We have introduced new terms to reflect learning activities to enhance your learning experience, aligning with our innovative [DeakinDesign learning principles and practices](#). The new terms better reflect how teaching teams will guide you through your learning journey and the types of learning experiences you will have.

**'Lectures'** are the activities where teaching staff engage you through presentations with student participation.

In **'seminars'**, an educator will guide you in a smaller group of students through highly interactive discussions and activities.

Your units may also include **'practical experiences'** such as **'laboratory'**, **'workshops'**, **'clinical skills'** and more. These hands-on activities typically take place in specialised facilities with industry tools, equipment or technology to allow you to apply your knowledge practically.

#### **Some other terms**

If you see a **'meeting'** in your timetable, this is an optional drop-in session.

**'Assessments'** or **'team-based learning'** indicate an in-class evaluation of your skills or knowledge. A **'pre-assessment practice'** could be scheduled to prepare you for these assessments.

#### **Find out more**

Take a look at the [Learning activities webpage](#) for a full list of the terminology changes and reasons they were changed.

#### **Unit learning resources**

Your unit learning resources are available in your unit site.

The texts and reading list for the unit can be found on the University Library via the link below: [SLE254](#) Note: Select the relevant trimester reading list. Please note that a future teaching period's reading list may not be available until a month prior to the start of that teaching period so you may wish to use the relevant trimester's prior year reading list as a guide only.

#### **Essential learning resources**

There is no prescribed text book for this unit. See below regarding recommended text.

#### **Recommended learning resources**

- Klug, Cummings, Spencer, Palladino & Killian (2019) Concepts of Genetics, 12th (or 11th) edition, Pearson.

Reference to this text will be continuously made throughout the duration of the unit and as such students are encouraged to purchase their own copy of this text.



Other recommended texts:

- Freeland, J.R., Kirk, H. & Petersen, S.D. (2011). Molecular Ecology, 2nd Ed. Wiley-Blackwell, Chichester.
- Snustad & Simmons (2011) Principles of Genetics, 6th Ed, John Wiley.

Deakin Library has a good range of genetics textbooks that will help with further information.

### Where to access unit resources

Textbooks can be sourced from various outlets including direct from the publisher, online bookshops, or retailers. Limited copies of textbooks are also available on loan from the University Library.

### Key dates for this study period

<b>Trimester 2 teaching period begins</b>	Monday 8 July 2024
<b>Census date</b>	Thursday 15 August 2024
<b>Intra-trimester break</b>	Monday 12 August – Sunday 18 August
<b>Trimester 2 teaching period ends</b>	Friday 27 September 2024
<b>Study period (end-of-unit assessment /examination preparation period)</b>	Monday 30 September – Friday 4 October 2024
<b>End-of-unit assessment and examination period</b>	Monday 7 October-Friday 18 October 2024
<b>Inter-trimester break (the period between trimesters)</b>	Monday 21 October-Friday 1 November 2024
<b>Unit results released</b>	Friday 1 November 2024 (10.30 am)

### Unit weekly activities

Week	Commencing	Topic	Assessment activity
1	8 July 2024	Introduction to the unit Mitosis and Meiosis <b>Textbook:</b> p50-71 Ch2 Gene inheritance and transmission <b>Textbook:</b> p73-96 Ch3	
2	15 July	Pedigree analysis <b>Textbook:</b> p83-90 Ch3  Extensions of Mendelian Genetics <b>Textbook:</b> Ch4  Sex determination <b>Textbook:</b> p131-150 Ch5	<b>Prac 1 starts</b>
3	22 July	Karyotypes  Chromosomal abnormalities <b>Textbook:</b> p151-174 Ch6  DNA structure & Chromosomal organization <b>Textbook:</b> p251-274 Ch10 <b>Textbook:</b> p302-319 Ch12	<b>Practical projects - Quiz</b>
4	29 July	DNA replication <b>Textbook:</b> p295-321 Ch11  Catch up Q&A  <b>Revision</b>	<b>Prac 2 starts</b>

Week	Commencing	Topic	Assessment activity
5#	5 August	Transcription and translation <b>Textbook:</b> p321-377 Ch13  DNA repair and mutations <b>Textbook:</b> p378-409 Ch15	<b>Online test 1 (covering lectures 1 to 11)</b>
6	19 August	Gene expression in prokaryotes <b>Textbook:</b> p411-429 Ch16  Gene expression in eukaryotes <b>Textbook:</b> Ch17  Recombinant DNA technology (Part 1) <b>Textbook:</b> p522-531 Ch20	<b>Prac 3 starts</b>
7	26 August	Recombinant DNA technology (Part II) <b>Textbook:</b> p522-531 Ch20, Special topics 1 p687-698  Extranuclear inheritance <b>Textbook:</b> p248-264 Ch9  Practical project report discussion	
8	2 September	Quantitative Genetics (part I) <b>Textbook:</b> p637-664 Ch23  Quantitative Genetics (part II) <b>Textbook:</b> p663-658 Ch23  <b>Revision</b>	<b>Prac 4 starts</b>
9	9 September	Population Genetics and Evolution (Part I) <b>Textbook:</b> Part 5 p659-686 Population Genetics and Evolution (Part II) <b>Textbook:</b> Part 5 p659-686	<b>Online test 2 (covering lectures 14 to 23)</b>
10	16 September	Genetic Evolution video task Genomics, Bioinformatics and Proteomics <b>Textbook:</b> p522-568 Ch21  Genomics and Personalized medicine <b>Textbook:</b> Special Topics 3 p710-720	<b>Practical project: poster report due</b>
11^	23 September	General revision / Discussion	
End-of-unit assessment period: 7 - 18 October			<b>End-of-unit assessment</b>

# Intra-trimester break: **Monday 12 August - Sunday 18 August 2024** (inclusive)^ AFL Grand Final Eve public holiday (University closed): **Friday 27 September 2024**