



## 1. General Course Information

### 1.1 Course Details

<b>Course Code:</b>	<b>1042SCG</b>
<b>Course Name:</b>	<b>Genetics and Evolutionary Biology</b>
<b>Trimester:</b>	<b>Trimester 2, 2020</b>
<b>Program:</b>	Diploma of Science
<b>Credit Points:</b>	10
<b>Course Coordinator:</b>	Claire Wang
<b>Document modified:</b>	23 May, 2020

### Course Description

Genetics and Evolutionary Biology is an introductory course that will provide foundational concepts in molecular genetics and evolutionary biology. Students will understand the process of inheritance and mutation, population genetics, and evolutionary theory at the molecular, organismal and population level. Students will also learn commonly used genetic analysis methods and techniques employed by scientists. Course content will be delivered through a combination of online/pre-recorded lectures, Workshops, and online material. Incompatible: Functional Molecular Genetics 1006BPS

#### Rationale

This course will instruct students in the fundamental concepts of inheritance, genetics, evolution and basic molecular techniques that are part of the experimental toolkits for molecular biologists, environmental scientists and evolutionary biologists alike. The course builds on concepts, describing these fundamental processes at the molecular scale right through to whole organismal and population scales. The molecular genetics concepts are also applied to understand the process of evolutionary theories.

### Assumed Knowledge

It is assumed that you have the background knowledge equivalence of Australian Grade 12 biology and that you are familiar with the main concepts covered in the course 1041SCG Biological Systems. If this is not the case, you are strongly advised to review the bridging materials and resources provided on the Griffith College student portal course website and contact the Course Convenor for additional support.

## 1.2 Teaching Team

Your lecturer/tutor can be contacted via the email system on the portal.

Name	Email
Claire Wang	Claire.Wang@staff.griffithcollege.edu.au

## 1.3 Staff Consultation

Your lecturer/tutor is available each week for consultation outside of normal class times. Times that your lecturer/tutor will be available for consultation will be found on the Moodle Course Site.

## 1.4 Timetable

Your timetable is available on the Griffith College Portal at Class Timetable in Student and Services.

## 1.5 Technical Specifications

All students must have access to a computer or suitable mobile device.

## 2. Aims, Outcomes & Generic Skills

### 2.1 Course Aims

Defining and describing the molecular basis of inheritance and evolution, as well as the information that a gene provides to an individual, is essential to health-care practitioners, evolutionary biologists and environmental scientists.

The course deals with the molecular basis of genetics, genetic inheritance and genetic analysis. It considers chromosomal inheritance, pedigree analysis, DNA mutation and repair, definitions of the gene and recombinant DNA technology. It also applies basic statistical tools to understand the process of population genetics and the forces that can impact genetic diversity in populations and evolution.



### 2.2 Learning Outcomes

After successfully completing this course you should be able to:

1. Define cellular reproduction, the molecular nature of the gene, how genes are inherited and the evolutionary concepts and process
2. Explain the regulation of a gene, specifically, its capacity for replication and repair, mutation and expression.
3. Apply theoretical skills in the analysis of genetic material and human disorders including genetic diseases.
4. Evaluate the principles of inheritance and genetic exchange among populations.



## 2.3 Generic Skills and Capabilities

For further details on the Generic Skills please refer to the Graduate Generic Skills and Capabilities policy.

Griffith College aims to develop graduates who have an open and critical approach to learning and a capacity for lifelong learning. Through engagement in their studies, students are provided with opportunities to begin the development of these and other generic skills.

Studies in this course will give you opportunities to begin to develop the following skills:

Generic Skills and Capabilities		Taught	Practised	Assessed
Acquisition of discipline knowledge and skills with critical judgement		✓	✓	✓
Communication and collaboration		✓	✓	✓
Self-directed and active learning		✓	✓	✓
Creative and future thinking		✓	✓	
Social responsibility and ethical awareness		✓	✓	
Cultural competence and awareness in a culturally diverse environment			✓	



## 3. Learning Resources

### 3.1 Required Learning Resources

#### Textbook:

Lisa A. Urry, Noel Meyers, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Jane B. Reece. (2017). Campbell Biology: Australian and New Zealand edition (11th edition). Pearson.

e-book version of this textbook is also available on: <https://www.pearson.com.au/9781488619878>

#### Virtual labs:

Molecular cloning - <https://www.labster.com/simulations/molecular-cloning/>

Gel electrophoresis - <https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/v/gel-electrophoresis>

Southern blotting - <https://www.khanacademy.org/test-prep/mcat/biomolecules/dna-technology/v/southern-blot>

DNA sequencing - <https://www.khanacademy.org/test-prep/mcat/biomolecules/dna-technology/v/dna-sequencing>

Hardy-Weinberg - [http://www.phschool.com/science/biology\\_place/labbench/lab8/intro.html](http://www.phschool.com/science/biology_place/labbench/lab8/intro.html)

## 3.2 Recommended Learning Resources

1. Benjamin A Pierce. (2014). Genetics: A conceptual approach. New York: W.H. Freeman.
2. D. Peter Snustad; Michael J Simmons. (2015). Principles of Genetics (7th edition). Wiley.

## 3.3 College Support Services and Learning Resources

The College provides many facilities and support services to assist students in their studies. Links to information about College support resources that are available to students are included below for easy reference.

[Digital Library](#) – Databases to which Griffith College students have access to through the Griffith Library Databases.

MyStudy – there is a dedicated website for this course via MyStudy on the Griffith College Portal.

[Academic Integrity Tutorial](#) - this tutorial helps students to understand what academic integrity is and why it matters. You will be able to identify types of breaches of academic integrity, understand what skills you will need in order to maintain academic integrity, and learn about the processes of referencing styles.

Services and Support provides a range of services to support students throughout their studies including academic advice and assignment help from Student Learning Advisors, and personal and welfare support from Student Counsellors.

Jobs and Employment in the [Student Hub](#) can assist students with career direction, resume and interview preparation, job search tips, and more.

[IT Support](#) provides details of accessing support, information on s numbers and internet access and computer lab rules.

## 3.4 Other Information about your Learning

### Attendance

You are expected to actively engage in all learning experiences and learning activities which underpin the learning content in this course. You are expected to engage with the learning content and learning activities outside of timetabled class times. This requires you to be an active agent of your learning. You are expected to bring all necessary learning resources to class such as the required textbook and /or Workbook. In addition, you are encouraged to BYOD (bring your own device) to class such as a laptop or tablet. This is not a requirement as computer lab facilities are available on campus, however, the use of such devices in the classroom is encouraged with appropriate and considerate use principles being a priority.

### Preparation and Participation in Learning

In order to enhance your learning, you need to prepare before participating in the learning experiences. Absorb the learning content and complete the learning activities that are provided online before you attend the scheduled learning experiences. Make sure you complete the learning activities set each week, they are designed to support your learning. Active participation in your learning will enhance your success. Ask questions when something is unclear or when you want to bring some issue to your lecturer or tutor's attention; respond to questions to test your knowledge and engage in discussion to help yourself and others learn.

### Consultation Sessions

Teachers offer extra time each week to assist students outside the classroom. This is known as 'consultation time.' You may seek assistance from your teacher on email or in person according to how the teacher has explained this to the class. Attendance during consultation time is optional but you are encouraged to use this extra help to improve your learning outcomes.

## **Course Learning Materials**

Learning materials are made available to you in MyStudy on the Griffith College Portal. The learning materials are arranged in Modules. In each Module you will find the learning content, learning activities and learning experiences. Actively working your way through these course learning materials together with your lecturer or tutor will prepare you to succeed when completing the evidence of learning (assessment).

## **Self-Directed Learning**

You will be expected to learn independently. This means you must organise and engage with the course learning content even when you are not specifically asked to do so by your lecturer or tutor. The weekly guide will be helpful to organise your learning. This involves revising the weekly course learning material and completing the learning activities. It also means you will need to find additional information to evidence your learning (assessment) beyond that given to you, and to construct your own response to a question or topic. All of this requires careful planning of your time. Expect to spend, on average, at least 10 hours per week including class time for each of your courses.

## **Program Progression**

You are reminded that satisfactory Program Progression requires that attendance in classes is maintained at equal to or greater than 80%, and that GPA is maintained at equal to or greater than 3.5 [please see Griffith College Policy Library - Program Progression Policy - for more information].






## **Teacher and Course Evaluation**

Your feedback is respected and valued by your lecturers and tutors. You are encouraged to provide your thoughts on the course and teaching, both positive and critical, directly to your lecturer and tutor or by completing course and lecturer evaluations via Griffith College's evaluation tool whenever these are available.



#### 4. Learning Content, Learning Activities and Learning Experiences

##### 4.1 Modules for Learning and Weekly Learning Content, Learning Activities and Learning Experience




	Learning Content 	Learning activities 	Learning experiences 	Evidence of learning 	Learning outcome 
<b>Module 1 - Cellular reproduction and chromosomal basis of inheritance.</b>					
<b>1</b>	Review of cell cycle, mitosis and meiosis. Mendelian inheritance, pedigree analysis (theory of chromosome and inheritance patterns). Mechanism of sex inheritance.	Lecture Workshop Complete diagnostic quiz at home	Describe cell cycle and how genes are inherited. Observe and analyse pedigree.	Case study (2%)	1
<b>Module 2: Molecular basis of Inheritance and DNA mutations</b>					
<b>2</b>	Central dogma. DNA & Chromosome structure. DNA Replication.	Lecture Workshop DNA replication video Answers to diagnostic quiz at home	Describe DNA & Chromosome structure and how DNA replicates.	Case study (2%)	2
<b>3</b>	DNA Transcription and translation. Basic features of mutations and phenotypic effects.	Lecture Workshop DNA transcription & translation video	Discuss how proteins are expressed from DNA.	Case study (2%)	2
<b>4</b>	Molecular basis of Mutations. DNA Recombination. DNA repair.	Lecture Workshop Mutation and DNA recombination video	Observe how genes are mutated and repaired.	Case study (2%)	2
<b>Module 3: Recombinant DNA Technology</b>					
<b>5</b>	Vectors (components of vectors and how they should be used). Cloning of DNA. Polymerase chain reaction (PCR).	Lecture Workshop Virtual lab: molecular cloning	Demonstrate how to clone DNA using vectors and <i>in-vitro</i> .	Case study (2%)	3
<b>6</b>	Molecular analysis of DNA, RNA and protein.	Lecture Workshop Virtual lab: gel electrophoresis and Southern blotting	Describe the process of molecular analysis of DNA, RNA and protein.	Module online quiz - 1 (15%)	3
<b>7</b>	DNA sequencing. Human genome project. Introduction to genomics	Lecture Workshop Virtual lab: DNA sequencing	Explain how to sequence DNA using different technologies. Discuss the applications and benefits of human genome projects	Case study (2%)	3

	<b>Module 4: Microevolution/ Population Genetics</b>				
<b>8</b>	Modelling the Hardy Weinberg equilibrium. Introduction to the concept of evolutionary biology.	Lecture Workshop Virtual lab: Hardy-Weinberg principle	Apply molecular genetics and statistical tools to understand the process of population genetics.	Case study (2%)	4
<b>9</b>	Allelic variation and Hardy Weinberg equilibrium. Genetic diversity and evolution.	Lecture Workshop Perform statistical analysis (H-W principle)	Discuss what affects allelic frequencies in a finite population.	Case study (2%) Scientific report (30%)	4
<b>10</b>	Genetic diversity and gene flow, genetic drift, mutation and selection.	Lecture Workshop	Understand what affects genetic diversities.	Case study (2%)	4
<b>11</b>	Measuring genetic diversity at the population level. Examples.	Lecture Workshop Evaluate genetic diversities using statistics	Provide examples of how to measure genetic diversities	Module online quiz - 2 (15%)	4
<b>12</b>	Revision	Lecture Workshop	Revision	Case study (2%)	1-4



## 5. Evidence of Learning (Assessment Plan)

### 5.1 Evidence of Learning Summary

	 Evidence of learning	 Weighting	 Learning outcome	 Due Date
1	Case studies	20%	1-4	Week 1-5, 7-10, 12
2	Online module quizzes (2)	30%	1-4	Week 6 & 11
3	Scientific report	30%	2,3	Week 9
4	Final exam	20%	1-4	Final exam period

### 5.2 Evidence of Learning Task Detail

Case studies (Total of 20% - each case study 2%)

After completing the learning activities each week, students will work on a case study within a specified time frame. The case studies are a combination of practicals, videos or virtual lab demonstrations where students will complete and answer some questions at the end of each case study. Each case study is designed to check key concepts learnt from each week's learning contents and demonstrate evidence of learning weekly.

Online module quizzes (Total of 30% - each quiz 15%)

A self-paced online assessment for each module (module 1+2 for quiz 1 and module 3+4 for quiz 2/total of 2 quizzes) will be completed at weeks 6 and 11. The assessment will be comprised of a combination of multiple choice and problem solving questions and use a common theme/example to explore various aspects of the material delivered in each module throughout the course. The assessment will help students understand concepts discussed in Module 1 through to 4. They will also provide opportunity for students to measure their progress and prepare for the final examination questions. The assessment will be completed online via link on student portal. 15% for each module quiz.

Scientific report (30%)

Scientific report is a written assignment where students will have the opportunity to perform online research in scientific literature and apply statistical approach to understand genetics concepts at population level. The scientific report will consist of two parts. For part 1: students will select a topic related to molecular techniques applied in genetics and evolutionary biology at week 1. Students can explore the various process and applications in the technique and construct a summarised report of their findings. For part 2, students will apply statistical approach to analyse and understand genetics and evolutionary process at population level. The assessment aims to help students to learn how the knowledge and skills acquired in this course are applied in the industry. It also provides students the opportunity to practice academic writing with appropriate citation and references. The instructions of this assessment will be made available to students before week 3.

Final exam (20%)

The two hour exam at the end of the semester will examine the full content of this course and assess all module learning outcomes.



## 5.3 Late Submission

An evidence of learning (assessment) item submitted after the due date, without an approved extension from the Course Coordinator, will be penalised. The standard penalty is the reduction of the mark allocated to the assessment item by 5% of the maximum mark applicable for the assessment item, for each working day or part working day that the item is late. Evidence of learning items submitted more than five working days after the due date are awarded zero marks.

Please refer to the Griffith College website - Policy Library > Assessment Policy for guidelines and penalties for late submission.

## 5.4 Other Information about Evidence of Learning

### Retention of Originals

You must be able to produce a copy of all work submitted if so requested. Copies should be retained until after the release of final results for the course.

### Requests for extension

To apply for an extension of time for an evidence of learning item, you must submit an [Application for Extension of Assignment](#) form to your teacher at least 24 hours before the date the assignment is due. Grounds for extensions are usually: serious illness, accident, disability, bereavement or other compassionate circumstances and must be able to be substantiated with relevant documentation [e.g. [Griffith College Student Medical Certificate](#)]. Please refer to the Griffith College website - Policy Library - for guidelines regarding extensions and deferred assessment.

### Return of Evidence of Learning Items

1. Marks awarded for in-trimester evidence of learning items, except those being moderated externally with Griffith University, will be available on the Student Portal within fourteen [14] days of the due date. This does not apply to the final evidence of learning item in this course (marks for this item will be provided with the final course result).
2. Students will be advised of their final grade through the Student Portal. Students can review their final exam papers after student grades have been published. Review of final exam papers will not be permitted after the final date to enrol.
3. Marks for **all** evidence of learning items including the final exam (if applicable) will be recorded in the Moodle Course Site and made available to students through the Moodle Course Site.

*The sum of your marks of evidence of learning items in this course does not necessarily imply your final grade for the course. Standard grade cut off scores can be varied for particular courses, so you need to wait for the official release of grades to be sure of your grade for this course.*

## 6. Policies & Guidelines

Griffith College assessment-related policies can be found in the [Griffith College Policy Library](#) which include the following policies:

Assessment Policy, Special Consideration, Deferred Assessment, Alternate Exam Sitting, Medical Certificates, Academic Integrity, Finalisation of Results, Review of Marks, Moderation of Assessment, Turn-it-in Software Use. These policies can be accessed using the 'Document Search' feature within the [Policy Library](#)

**Academic Integrity** Griffith College is committed to maintaining high academic standards to protect the value of its qualifications. Academic integrity means acting with the values of honesty, trust, fairness, respect and responsibility in learning, teaching and research. It is important for students, teachers, researchers and all staff to act in an honest way, be responsible for their actions, and show fairness in every part of their work. Academic integrity is important for an individual's and the College's reputation.

All staff and students of the College are responsible for academic integrity. As a student, you are expected to conduct your studies honestly, ethically and in accordance with accepted standards of academic conduct. Any form of academic conduct that is contrary to these standards is considered a breach of academic integrity and is unacceptable.

Some students deliberately breach academic integrity standards with intent to deceive. This conscious, pre-meditated form of cheating is considered to be one of the most serious forms of fraudulent academic behaviour, for which the College has zero tolerance and for which penalties, including exclusion from the College, will be applied.

However, Griffith College also recognises many students breach academic integrity standards without intent to deceive. In these cases, students may be required to undertake additional educational activities to remediate their behaviour and may also be provided appropriate advice by academic staff.

As you undertake your studies at Griffith College, your lecturers, tutors and academic advisors will provide you with guidance to understand and maintain academic integrity; however, it is also your responsibility to seek out guidance if and when you are unsure about appropriate academic conduct.

In the case of an allegation of a breach of academic integrity being made against a student he or she may request the guidance and support of a Griffith College Student Learning Advisor or Student Counsellor.

Please ensure that you are familiar with the Griffith College Academic Integrity Policy; this policy provides an overview of some of the behaviours that are considered breaches of academic integrity, as well as the penalties and processes involved when a breach is identified.

For further information please refer to the Griffith College website - Policy Library > Academic Integrity Policy

### **Reasonable Adjustments for Assessment – The Disability Services policy**

The Disability Services policy (accessed using the Document Search' feature with the [Policy Library](#)) outlines the principles and processes that guide the College in making reasonable adjustments to assessment for students with disabilities while maintaining academic robustness of its programs.

### **Risk Assessment Statement**

There are no out of the ordinary risks associated with this course.

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