



# **GENE4002 Integrated Topics in Genetics I**

## Introduction to Unit

Semester 2, 2024

A/Prof Heng Chooi  
School of Molecular Sciences



# Acknowledgement to Country

*We acknowledge that the University of Western Australia (UWA) Crawley campus is situated on Noongar land, that the Noongar people remain the spiritual and cultural custodians of their land and continue to practice their values, languages, beliefs and knowledge.*



# UWA STUDYING ONLINE ETIQUETTE: Using Zoom and Teams



Log in using your  
Student ID and  
full name



Dress as you normally  
would for a uni class



Arrive on time and  
prepared



Sit in a well-lit space  
with a neutral  
background



Use a headset with  
external mic



Close other  
applications and  
eliminate distractions



Mute your mic when  
not speaking



Turn on/~~off~~ your  
camera as needed  
On is encouraged



Use "raise hand"  
feature to indicate you  
want to talk



Use chat function to  
ask questions silently



Do not record/share  
sessions without  
permission



Be patient and  
respectful towards  
everyone

**We expect  
respect**

*All UWA students must engage in online learning in a manner that reflects our Code of Conduct.  
Demonstrate personal responsibility and uphold the University's values in all communications.*



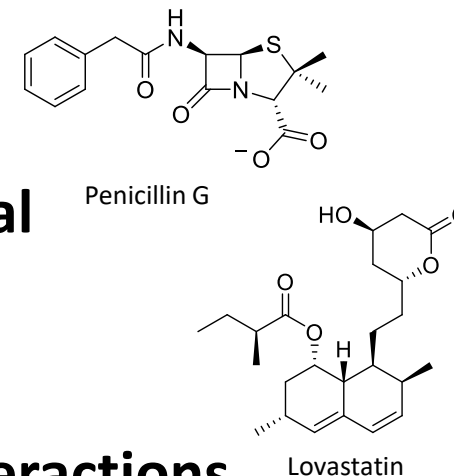
# Unit Coordinator: A/Prof Heng Chooi

- Position: Associate Professor
- Office: Bayliss Building, Room 2.58
- Email: [yitheng.chooi@uwa.edu.au](mailto:yitheng.chooi@uwa.edu.au)
- Phone: 08 6488 3041
- Consultation: by appointment



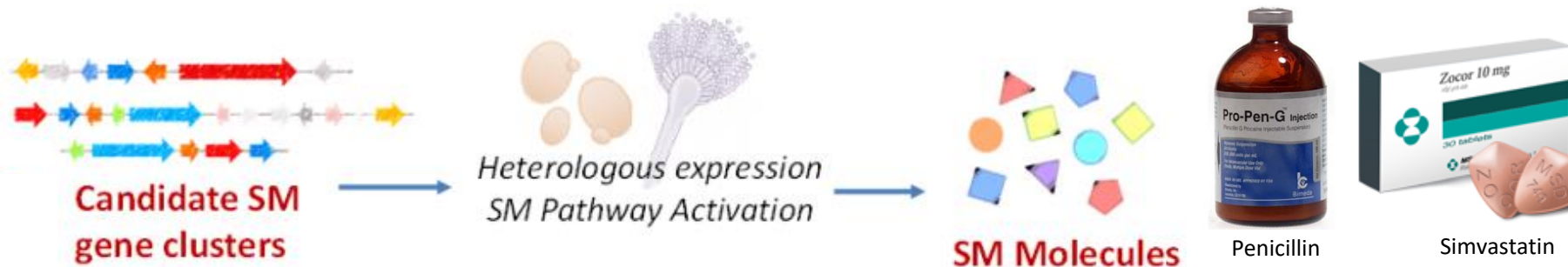
## Research Interests

- Genetics and biochemical basis of fungal secondary metabolite (natural product) biosynthesis:
- Genetic engineering/synthetic biology of antibiotics/natural products
- Uncover the extended genotype - small molecules in host-microbe interactions



## Technologies:

Fungal genetics and genomics, recombinant DNA techniques; synthetic biology and metabolic engineering; recombinant protein expression and enzyme characterisation; analytical chemistry (compound isolation, HPLC-MS, etc.)



For more information about research please visit [www.chooilab.org](http://www.chooilab.org)

# Lecturer: Dr Mark Waters

Location: Bayliss Building 2.59

email: [mark.waters@uwa.edu.au](mailto:mark.waters@uwa.edu.au)

Covers topic Set 2 - 3

Office Hours: By appointment



Research Interests: Genetic and molecular basis of plant development, Hormone perception and signalling mechanisms in plants, Evolution of hormone signalling systems, Protein-ligand interactions

The subjects of his studies are using model plant *Arabidopsis thaliana* to dissect how plants perceive plant hormones and growth regulators, especially karrikins.

Technologies Used: plant genetics (forward and reverse genetics), molecular biology, protein-protein interactions, transcriptomics, synthetic biology

## Unit Information

Content	This unit consists of lectures and related activities focusing on Mendelian genetics and introductory level molecular, population, cyto- and quantitative genetics. The lectures are prerecorded and organised into modules that cover mechanisms and techniques of molecular genetics, mutation and repair, linkage analysis, gene function and expression, and transgenesis in animals and plants. Face-to-face tutorials will focus on student understanding of the learning outcomes associated with each lecture module.		
Unit Learning Outcomes	#	Outcome	How outcome will be assessed
	1	become knowledgeable in and have an appreciation for molecular genetic mechanisms, mutation and repair, gene function, transgenesis in animals and plants, genes controlling developmental processes in eukaryotic organisms, and the influences of evolution and the environment animals and plants	Online quizzes,worksheets, participation
	2	gain advanced knowledge of genomic and post-genomic technologies, how genomes are analysed and the resources available to do this	Online quizzes, worksheets, participation

*Why do you do Genetics?*

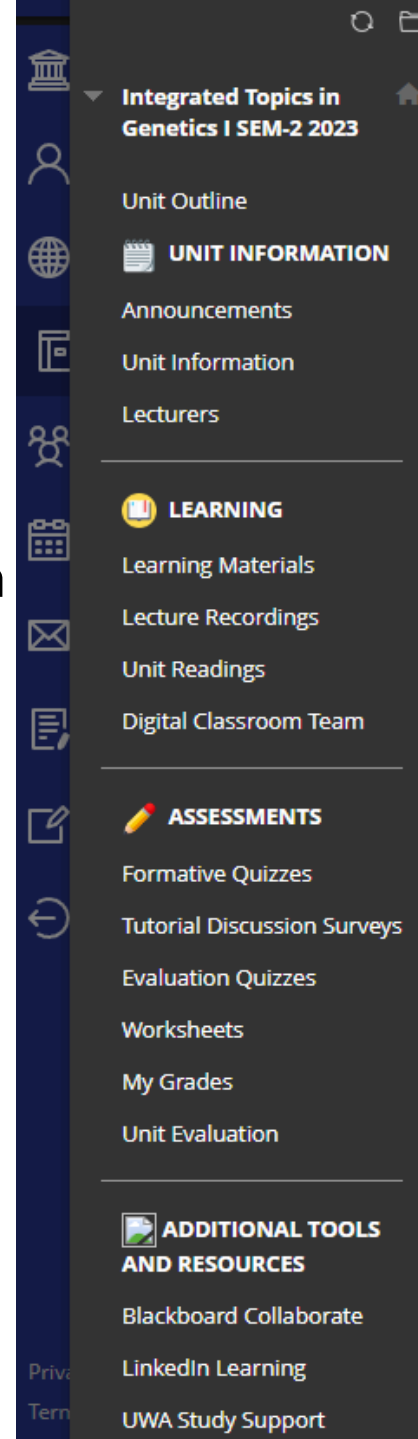
*What Major are you in?*



# Learning Management System (LMS)

- Unit Outline/Unit Guide
- Lecture Materials
- Lecture Recording/Link to Lecture Capture System
- Pre-tutorial Quizzes
- Evaluation Quizzes
- Worksheets and Submission
- Tutorial Discussion Surveys

Let's have a look together on LMS  
URL: [www.lms.edu.au](http://www.lms.edu.au)



The screenshot shows a dark blue sidebar menu for a Learning Management System. At the top, there is a header for 'Integrated Topics in Genetics I SEM-2 2023'. Below this, the menu is organized into sections: 'Unit Outline', 'UNIT INFORMATION' (with a calendar icon), 'Announcements', 'Unit Information', and 'Lecturers'. A horizontal line separates this from the 'LEARNING' section, which includes 'Learning Materials', 'Lecture Recordings', 'Unit Readings', and 'Digital Classroom Team'. Another horizontal line follows, leading to the 'ASSESSMENTS' section, which lists 'Formative Quizzes', 'Tutorial Discussion Surveys', 'Evaluation Quizzes', 'Worksheets', 'My Grades', and 'Unit Evaluation'. A final horizontal line introduces the 'ADDITIONAL TOOLS AND RESOURCES' section, containing 'Blackboard Collaborate', 'LinkedIn Learning', and 'UWA Study Support'. On the far left of the sidebar, there is a vertical column of icons representing various functions like home, user profile, search, and notifications.




The screenshot shows the main content area of the LMS. The background is a light purple gradient with the text 'GENE4002 Integrated Topics in Genetics I' in large white letters. On the right side, there is a vertical white line. Below the main content area, there is a white section titled 'Announcements'. The first announcement is 'GENE4002 Unit Introduction Today 4-5PM'.

## Lecture Recording System

Enabled: Statistics Tracking



 Welcome to the new lecture capture system.

Click the title above to launch the Unit's Dashboard and view recorded lectures.

You can get a quick introduction to using the system from the [help pages](#).

echovideo

Library

Courses

Collections

Analytics

 Create 

RESET LMS LINK

UNLINK LMS COURSE

GENE4002 - GENE4002\_SEM-1\_2024 Integrated Topics in Genetics[GENE4002]

REORDER

Search

 TOPIC SET 1

Prokaryotic Genetics I

Prokaryotic Genetics II

Mendelian Genetics I

Mendelian Genetics II

 TOPIC SET 2

 TOPIC SET 3

 TOPIC SET 4

 TOPIC SET 5

# GUIDELINES FOR RESPONDING TO SURVEY FOR TUTORIALS

The survey aims to enable the lecturer to assess which topics and questions warrant additional time and focus during the tutorial to maximise the benefits for the students.

Please watch the lecture recordings and review the lecture materials along with suggested readings prior to doing this Survey for the upcoming Topic Set 1 Tutorial discussion. Please submit your survey before the due date (5 days before the tutorial) according to the Unit Schedule.

Integrated Topics in Genetics I SEM-2 2023

Unit Outline

UNIT INFORMATION

Announcements

Unit Information

Lecturers

LEARNING

Learning Materials

Lecture Recordings

Unit Readings

Digital Classroom Team

ASSESSMENTS

Formative Quizzes

Tutorial Discussion Surveys

Evaluation Quizzes

Begin: GENE4002 Topic Set 1 Tutorial Survey

INSTRUCTIONS

Description	This survey aims to enable the lecturer to assess which topics and questions warrant additional time and focus during the tutorial.
Instructions	Please watch the lecture recordings and review the lecture materials along with suggested readings prior to doing this Survey for the activity contribute to Participation Marks for the unit (see Unit Guide).
Force Completion	This survey can be saved and resumed later.
Multiple Attempts	This survey allows multiple attempts.
Due Date	This Survey is due on 11 August 2023 11:59:00 PM AWST. Survey cannot be started past this date.

Click **Begin** to start: GENE4002 Topic Set 1 Tutorial Survey. Click **Cancel** to go back.

Click **Begin** to start. Click **Cancel** to quit.

QUESTION 1

Which of the following concepts on Prokaryotic Genetics would you like the lecturer to discuss more during the tutorial? Please select a maximum of 3 answers.

- ☐ Model Organisms:  
Why bacteria such as Escherichia coli is chosen as a model organism? What are the criteria for a good model organism?
- ☐ Culturing bacteria:  
In what circumstances is beneficial to use liquid vs solid media?  
How is minimal/defined media different from complex media for bacterial culture? When would you want to use one or the other?
- ☐ Bacterial auxotrophy:  
How is the normal auxotrophy different from chemoauxotrophy? e.g. leu- and lac- both have the sign "-", but the requirement is different.  
How does replica plating work to find out auxotrophy?  
How can we determine the bacterial genotypes if there are more than one auxotrophies?
- ☐ Exchange of Genetic Material:  
How is the auxotrophy complemented during bacterial genetic exchange? What does recombination means? What is the evidence for genetic exchange?
- ☐ Bacterial conjugations:  
Where do F' cells come from? Are all E. coli cells with F' factor partially diploid? When are cells considered as partial diploid?  
What is interrupted conjugation mapping? Please explain graph which includes time and frequency of Hfr genetic crosses.
- ☐ Bacterial transformation:  
Bacterial genomes can be mapped either via conjugation or transformation. Is one of them used for genetic mapping more than the other?  
Single stranded DNA from the environment and the plasmid transformation we do in the lab similar?
- ☐ Bacterial Transduction:  
Can bacteriophage infect all types of bacteria?  
How does bacteriophage decide to follow lytic or lysogenic cycle? It depends more on the environmental factor or the host cell?  
If bacteriophage can kill bacteria, why don't we use it like an antibiotics?

This activity contribute to Participation Marks for the unit (see Unit Guide).

## Unit Contact

### Tutorials

Wednesday: 4-6 pm [week 31 (31/7), 33 (14/8), 35 (38/8), 37 (11/9), 40(2/10), 42 (16/10)]  
via MS Teams  
(Teams recordings mainly for record keeping and revision)

### Lectures

Lecture recordings\* available through Lecture Capture System (LCS)

Lecture notes available through Lecture Management System (LMS)

\*Ignore references to laboratory practicals, tutorials and lectures  
not in the GENE4002 Topic Sets in the lecture recordings.

Some of the lecture recordings may have parts of other lectures in them – find the slides that correspond to the GENE4002 lecture notes.

Consultation sessions: by appointment in office or over Teams (we will try to answer your questions by email first)



## More on Tutorials

- Tutorials are COMPULSORY. Attendance is expected and is graded. It is the main mode of contact for this unit and there're only 5 tutorials!
- IMPORTANT: please let your Unit Coordinator know beforehand if you are unable to attend in person due to time-table clashes or extraneous circumstances.
- Please seek Special Consideration if you are unable to attend the tutorials due to significant reasons as attendance carry participation marks.
- To make the most efficient use of tutorial time, students should vote for the topics/questions they need help most in the Tutorial Topic Survey for each Topic Set on GENE4002 LMS site.
- The survey should be added by the Friday preceding the Tutorial.
- Students are encouraged to post additional questions on LMS Discussion Board or better - raise hand and ask questions during tutorial.

## Assessment Mechanisms

Item	Weight	Description and due date
Online Evaluation Quizzes:	40%	One Evaluation Quiz of each topic set. Opens on LMS after the tutorial of the corresponding topic and due in two weeks (8 marks each for 5 topic sets)
Worksheets	50%	One Worksheet for each topic set consist of mainly short answer questions. Open at the same time as Evaluation Quiz (10 marks each). Worksheet 1 due separately, Worksheet 2/3 and Worksheet 4/5 due together
Participation (incl. tutorial attendance, pre-tutorial quizzes, and tutorial survey)	10%	Pre-tutorial Quiz: One for each topic set. Opens two weeks prior to the tutorial topic and due the Monday before the corresponding tutorial (1 marks each). Tutorial Topic Survey on LMS: submit your choices on the Friday before the corresponding tutorial (optional: submit questions on LMS Discussion Board). Attendance at tutorials: Compulsory (half of the participation marks). Bonus for participating in discussion during tutorial and LMS Discussion Board.

WE ARE HERE TO HELP YOU LEARN AND NOT TO PENALISE YOU!

## Assessments:

**Pre-tutorial Quizzes (PQs):** These online quizzes on LMS are formative in nature. You have UNLIMITED attempts. Its purpose is to prompt you to have questions during the upcoming tutorials about the topic. There is one PQ for each topic (1 mark each) and will contribute towards Participation Marks. It will be released 2 weeks before the topic's tutorial and due a day before the topic's tutorial.

**Evaluative Quizzes (EQs):** These are online quizzes on LMS. You have only ONE attempt and must be carried out in one sitting in the specified time frame (30 mins). Its purpose is to test your understanding about each topic and is one of the main assessment mechanisms. There are one EQ for each topic (8 marks each, 40 marks total). It will be released the day following the topic's tutorial and due ~2 weeks before the next topic's tutorial.

**Worksheets (EQs):** These are PDF worksheets that you can do at your own time during the period of the assessment. Its purpose is to test your deeper understanding of each topic and ability to work out the problems and explain them. Worksheets will be submitted through LMS Turnitin Submission Portal and will go through Plagiarism checking. There are one WS for each topic (10 marks each, 50 marks total). It will be released the day following the topic's tutorial. You will be given ~ 2weeks time for each worksheet, but Worksheet Topic 2/3 and 4/5 are combined and due together.

# GENE4002 SEM2 2024 Overview for Workshops, Lectures and Assessments

Tutorial date	Topic Set	Lecture topics	Tutor	Pre-tutorial Quiz (PQ)	Eval. Quiz (EQ)	Worksheet (WS)
31/07/2024		Introduction to GENE4002	Heng Chooi			
14/08/2024	Topic Set 1	Prokaryotic Genetics Mendelian Genetics I & II (Review of Cytogenetics)	Heng Chooi	25/03 PQ2 due	15/08 release EQ1  28/08 EQ1 due	15/08 release WS1  28/08 WS1 due
28/08/2024	Topic Set 2	Linkage Analysis I & II Linkage & Mapping I & II (Review of Mitosis/Meiosis)	Mark Waters	23/08 PQ3 due	29/08 release EQ2  11/09 EQ2 due	29/08 release WS2
11/09/2024	Topic Set 3	Genotype and Allele Frequencies Hardy-Weinberg Equilibrium Natural Selection Mutation, Genetic Drift and Migration	Mark Waters	06/09 PQ4 due	12/09 release EQ3  02/10 EQ3 due	12/09 release WS3  02/10 WS2/3 due
2/10/2024	Topic Set 4	Molecular Genetics I & II Molecular Genetics II & IV	Heng Chooi	20/09 PQ4 due	03/10 release EQ4  16/10 EQ4 due	03/10 release WS4
16/10/2024	Topic Set 5	Gene Mutations I & II Transcgenics I-III	Heng Chooi	11/10 PQ4 due	17/10 release EQ5  30/10 EQ5 due	17/10 release WS5  30/10 WS4/5 due

Tutorial (MS Teams) Wednesday 4-6 pm

A PDF copy will be on LMS under Unit Information



## GENE4002 SEM2 2024 Tutorial and Assessment Timetable

August		September		October	
31 Wed	<b>Introduction to unit (HC)</b>	31 Sat		1 Tue	
1 Thu	PQ 1 released	1 Sun		2 Wed	<b>Workshop Topic Set 4 (HC)</b>
2 Fri		2 Mon	Watch recorded lectures in	3 Thu	PQ 5, EQ/WS 4 released
3 Sat		3 Tue	Topic Set 3	4 Fri	
4 Sun	Watch recorded lectures in	4 Wed		5 Sat	
5 Mon	Topic Set 1	5 Thu		6 Sun	Watch recorded lectures in
6 Tue		6 Fri	<b>Answer Topic 1 Survey</b>	7 Mon	Topic Set 5
7 Wed		7 Sat		8 Tue	
8 Thu		8 Sun		9 Wed	
9 Fri	<b>Answer Topic 1 Survey</b>	9 Mon	PQ 3, EQ 2 DUE	10 Thu	
10 Sat		10 Tue		11 Fri	<b>Answer Topic 5 Survey</b>
11 Sun		11 Wed	<b>Tutorial Topic Set 3 (MW)</b>	12 Sat	
12 Mon	PQ 1 DUE	12 Thu	PQ 4, EQ/WS 3 released	13 Sun	
13 Tue		13 Fri		14 Mon	PQ5, EQ 4 DUE
14 Wed	<b>Tutorial Topic Set 1 (HC)</b>	14 Sat		15 Tue	
15 Thu	PQ 2, EQ/WS 1 released	15 Sun		16 Wed	<b>Tutorial Topic Set 5 (HC)</b>
16 Fri		16 Mon	Watch recorded lectures in	17 Thu	EQ/WS 5 released
17 Sat		17 Tue	Topic Set 4	18 Fri	
18 Sun	Watch recorded lectures in	18 Wed		19 Sat	
19 Mon	Topic Set 2	19 Thu		20 Sun	
20 Tue		20 Fri		21 Mon	
21 Wed		21 Sat		22 Tue	
22 Thu		22 Sun		23 Wed	
23 Fri	<b>Answer Topic 2 Survey</b>	23 Mon		24 Thu	
24 Sat		24 Tue		25 Fri	<b>Answer Topic 4 Survey</b>
25 Sun		25 Wed		26 Sat	
26 Mon	PQ 2, EQ1, <b>WS 1</b> DUE	26 Thu		27 Sun	
27 Tue		27 Fri	<b>Answer Topic 4 Survey</b>	28 Mon	
28 Wed	<b>Tutorial Topic Set 2 (MW)</b>	28 Sat		29 Tue	
29 Thu	PQ 3, EQ/WS 2 released	29 Sun		30 Wed	EQ 5, <b>WS 4/5</b> DUE
30 Fri		30 Mon	PQ 4, EQ 3, <b>WS 2/3</b> DUE	31 Thu	

A PDF copy will  
be on LMS  
under Unit  
Information

Penalty for late work: five percentage points (5%) per day (includes Saturday and Sunday)

Communication: Do not expect an answer to an email outside of business hours (Monday – Friday, 9.00 – 17.00) (Although I may). Please also provide at least 24 hr, as sometimes we couldn't get to all the emails within a day. And if you did not get an answer after 48 hr, please follow up with another email (unless is super urgent).

Please check the “Announcement” section in the unit's LMS page before sending an email. Your question may have already been addressed.

**Plagiarism:** any doubts about what constitutes plagiarism, see

<http://www.teachingandlearning.uwa.edu.au/staff/policies/conduct>

## PLAGIARISM DETECTION SOFTWARE USED FOR WORKSHEET SUBMISSION – TURNITIN

A few words of advice from Dr Mark Waters (Academic Misconduct Officer)

### Can I use ChatGPT and other AI tools in my assessments?

UWA's Academic Integrity Policy allows for the limited use of AI in research, study and assessment. The policy permits you to use AI as educational and study tools. You can use them to assist in your research, your study, and for broad editorial assistance in your writing.

AI tools **may only be used** in an assessment where it is **explicitly permitted** by your Unit Coordinator. And in the case for the GENE4002 Worksheets – the answer is **NO** (Warning that we often find the answers are wrong).

## Unit Readings:

Textbooks: Benjamin A. Pierce

*Genetics A Conceptual Approach* (c 2014, 5<sup>th</sup> edition)

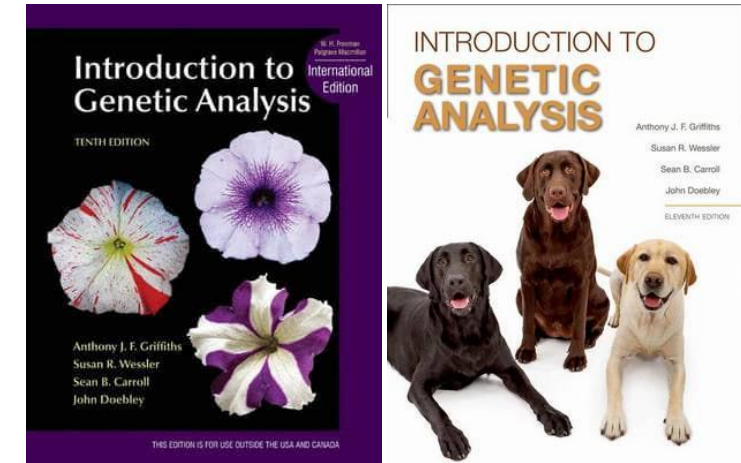
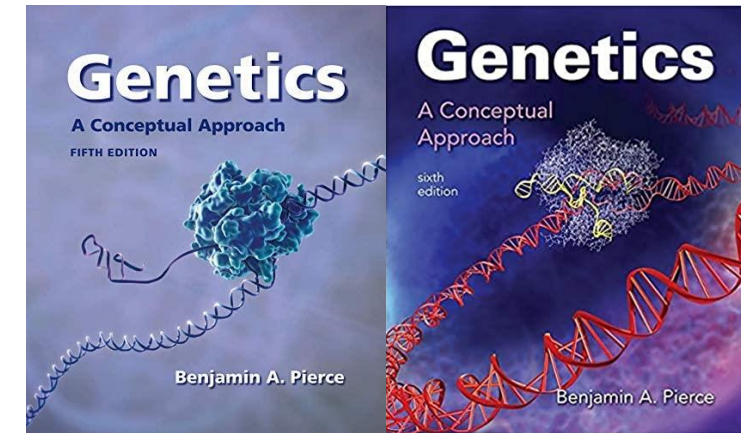
– an e-copy of this book should be available via the library.

A.J.F. Griffiths, S.R. Wessler, S.B. Carroll & J. Doebley

*Introduction to Genetic Analysis* (c 2012, 10<sup>th</sup> edition)

See LMS for Online Copy

Copies of various editions of both textbooks are available in the BJ Marshall Library





# GENE4002

- **Quizzes and worksheets will be available the day following the corresponding tutorials\***

If you do not see the expected quizzes or worksheet automatically made available on LMS, please email the Unit Coordinator knows immediately (sometimes they were not released on time due are errors in settings on LMS).

**Enjoy and Good Luck for this Unit!**