

Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: MAMMALIAN GENETICS

Unit ID: SCMOL2010

Credit Points: 15.00

Prerequisite(s): (SCBIO1001 or SCBIO1010 or SCBIO1020)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 010909

Description of the Unit:

Mammalian Genetics provides an in depth understanding of the principles underlying mammalian inheritance. The unit reviews and builds upon the basics of structure of genetic material and information control and flow. Topics will build upon those of core first year units and will encompass: DNA/RNA structure and function; cell reproduction and chromosome replication and how these relate to genetic diversity and evolution; gene structure and function and the relationship between genes and proteins; types of genetic mutation will be discussed in the context of natural variability and disease. This unit also covers pedigree analysis and the different modes of inheritance: recessive and dominant, autosomal and sex linked traits and how genetic changes can be observed and quantified at the population level. Students will also be asked to consider the ethical issues associated with new gene based technologies in animals and humans. This unit provides an introduction to bioinformatics; to learn how to access and interpret information from large molecular databases and use various analysis software to use digital information to investigate a topic of interest.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a

task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	■	■	■	■	■	■
Intermediate	■	■	✓	■	■	■
Advanced	■	■	■	■	■	■

Learning Outcomes:

Knowledge:

- K1.** Demonstrate an understanding of the basic principles of cellular reproduction, chromosome replication and Mendelian inheritance.
- K2.** Describe basic gene structure and function and the factors that regulate gene expression
- K3.** Identify the genetic mutations and abnormalities that can result in disease conditions
- K4.** Describe the current applications of gene-based technology and discuss the ethical implications of gene manipulation.

Skills:

- S1.** Analyse pedigree charts to identify patterns of inheritance and understand the principles of calculating gene frequencies within a population
- S2.** Collect, compare and interpret genomic data from large molecular databases (bioinformatics)
- S3.** Research genetic issues and effectively communicate this research through the preparation of clear, concise written reports and oral presentations

Application of knowledge and skills:

- A1.** Utilise bioinformatics skills to research the molecular basis and inheritance of genetic disorders and evolutionary relationships.
- A2.** Apply knowledge of gene structure and molecular techniques to design theoretical strategies for genetic testing in medical or commercial applications

Unit Content:

Topics may include:

- Review of mitosis, meiosis and information flow in biology
- The organisation of genes, chromosomes and the human genome
- Patterns of genetic inheritance - monogenic and polygenic traits, sex determination, analysis of pedigree charts, calculating allele frequency
- Genetic mutations - different types of genetic mutation and their relationship to disease
- Molecular mechanisms of DNA damage and repair
- Gene structure and regulation of expression: understanding how genes are switched on and off at specific times and in specific tissues. Relationship between genome, transcriptome, proteome
- Bioinformatics: obtaining and understanding information from large gene databases
- Bioethics: handling and storage of genetic information, implications of genetic modification of animals and crop plants
- Modern DNA technologies and their applications

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**tttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	Students will demonstrate the ability to effectively communicate, interact and work with others both individually and in groups. Students will be required to display skills in-person and/or online in: <ul style="list-style-type: none"> • Using effective verbal and non-verbal communication • Listening for meaning and influencing via active listening • Showing empathy for others • Negotiating and demonstrating conflict resolution skills • Working respectfully in cross-cultural and diverse teams. 	N/A	N/A
FEDTASK 2 Leadership	Students will demonstrate the ability to apply professional skills and behaviours in leading others. Students will be required to display skills in: <ul style="list-style-type: none"> • Creating a collegial environment • Showing self-awareness and the ability to self-reflect • Inspiring and convincing others • Making informed decisions • Displaying initiative 	N/A	N/A
FEDTASK 3 Critical Thinking and Creativity	Students will demonstrate an ability to work in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: <ul style="list-style-type: none"> • Reflecting critically • Evaluating ideas, concepts and information • Considering alternative perspectives to refine ideas • Challenging conventional thinking to clarify concepts • Forming creative solutions in problem solving 	K1-K4, S1-S3, A1-A2	AT1-4
FEDTASK 4 Digital Literacy	Students will demonstrate the ability to work fluently across a range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: <ul style="list-style-type: none"> • Finding, evaluating, managing, curating, organising and sharing digital information • Collating, managing, accessing and using digital data securely • Receiving and responding to messages in a range of digital media • Contributing actively to digital teams and working groups • Participating in and benefiting from digital learning opportunities 	S1-S3,A1-A2	AT2,AT3

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 5 Sustainable and Ethical Mindset	Students will demonstrate the ability to consider and assess the consequences and impact of ideas and actions in enacting ethical and sustainable decisions. Students will be required to display skills in: <ul style="list-style-type: none"> • Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts • Committing to social responsibility as a professional and a citizen • Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses • Embracing lifelong, life-wide and life-deep learning to be open to diverse others • Implementing required actions to foster sustainability in their professional and personal life. 	N/A	N/A

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K3, S1, A2	AT1: Assessing application and retention of knowledge on key topic areas. Quiz based assessment of understanding of key concepts	Multiple choice quizzes, short answer questions and problems requiring application of knowledge	10-30%
K2, K3, S2, S3, A1, A2	AT2: Analytical Bioinformatics tasks requiring research and use of bioinformatics tools and databases	Questions and problem solving tasks requiring research and use of bioinformatics tools and databases	10-30%
K1, K2, K3, K4, S2, S3, A1, A2	AT3: Research and report upon genes of interest	Presentation and/or written report	20-50%
K1, K2, K3, K4, S1, A2	AT4: Quiz and test demonstrating and applying knowledge from unit content	Test	20-50%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit

Yes

Date:

Apr 14, 2023

Adopted Reference Style:

APA

Refer to the [library website](#) for more informationFed Cite - [referencing tool](#)