Course Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Course Title:	MAMMALIAN GENETICS
Course 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 Course:

Mammalian Genetics provides an in depth understanding of the principles underlying mammalian inheritance. The course 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 courses 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 course 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 course 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)
Placement Component:	No
Supplementary Assessment:	Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	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

Course 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

Values:

V1. Appreciate the importance of the field of genetics in biology and medicine

V2. Appreciate the complexity and diversity of genetic disease and inheritance modes

V3. Develop an increased awareness of the environmental, social, ethical, legal and economic implications of genetics and decisions involving principles of inheritance and biotechnology

V4. Adopt a professional and ethical approach to studying genetics

Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K4, S1-S3, A1, A2	AT1 AT2 AT3 AT4
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	N/A	N/A
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	K1-K4, S2, S3, A1, A2	AT3
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K1-K4, S2, S3, A1, A2	AT3
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	N/A	N/A

Learning Task and Assessment:

Learning Outcomes Assessed	Learning 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 course content	Test	20-50%

Adopted Reference Style:

Australian Harvard

Refer to the library website for more information

Fed Cite - referencing tool