BIOS 2018 GENETICS

Credit Points 10

Legacy Code 300845

Coordinator Nathan Absalom (https://directory.westernsydney.edu.au/search/name/Nathan Absalom/)

Description Our ability to rapidly and cheaply sequence a genome, ranging from humans, to native and domesticated plants and animals, and infectious bacteria and viruses, has revolutionised the field of genetics. More than ever, we understand our genetic relationship to life on earth, uncovering surprising similarities between our genome and the genomes of small worms and fruit flies. This subject will compare the genomes of different organisms and apply the methodology and theory of modern genetics to understand how the diversity of genetic variability impacts the structure and evolution of genomes, the expression of genes, and ultimately on the health and form of an organism.

School Science

Discipline Genetics

Student Contribution Band HECS Band 2 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Equivalent Subjects LGYB 5446 - Genetics 22 BIOS 2019 - Human Genetics BIOS 2017 - Genetics

Restrictions

Successful completion of 60 credit points

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Summarise features of the human genome, and compare and contrast the human genome with the genomes of selected plant, animal and pathogen genomes
2. Describe the basic principles of genetic and epigenetic control of gene expression
3. Apply your knowledge of genomes and DNA sequencing methodologies to the bioinformatic analysis of DNA sequences
4. Explain the origin and frequency of common and rare genetic variants
5. Correlate genetic variability with phenotypic variability in health and disease
6. Apply your knowledge of genetic variation in different contexts to identify regions of a genome that are associated with specific phenotypes
7. Analyse and critically evaluate genetic data and present this in the form of a written report

Subject Content

1.Genome structure: compare and contrast the human genome with the genomes of model plant and animal genomes, as well as bacterial and viral genomes
2.Decoding the genome: Sanger and Next-generation DNA sequencing
3.Annotating the genome: genes and genetic switches; coding and non-coding DNA; transcription and open reading frames
4.Introduction to Bioinformatics: homology search and alignments; translation, mutations and reading frames
5.Genetic variants, health and disease: repeat sequences, translocations, aneuploidy, smaller insertions, deletions and substitutions
6.Controlling the genome, an introduction to epigenetics: DNA methylation (X-inactivation, imprinting, gene transcription); the histone code and chromatin packaging
7.Single gene and polygenic traits: pedigrees, populations, penetrance and effect sizes
8.Gene and trait mapping: recombination, linkage and linkage disequilibrium with worked examples from humans (Mendelian disease and population genetics), plants (plant breeding) and animals (ecology and conservation)
9.Genomes and the environment: host-pathogen interactions and selection in genomes

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task
Quiz	A combined multiple choice and short answer quiz assessing skills learnt in online practicals and the lecture and workshop content	20	N	Individual
Quiz	Multiple Choice and short answer questions that will assess the lecture, workshop and practical content of the course	20	N	Individual
Report	2000 words max. Two reports, one group report for Introduction, Aims, Methods and References, a second report for Results, Conclusions and References.	30	N	Individual

Report	1000 word report. Students will be given a set of genetic variants to choose and analyze and they must write a report describing the effects of the variant and how they came to the conclusion consistent with ACMG Guidelines	30	N	Individual

Prescribed Texts

- Klug, WS, Cummings, MR, Palladino, MA & Spencer, CA 2010, Essentials of genetics, 7th edn, Pearson Benjamin Cummings, San Francisco, CA.

Teaching Periods

Autumn (2024)

Campbelltown

On-site

Subject Contact Graham Jones (https://directory.westernsydney.edu.au/search/name/Graham Jones/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=BIOS2018_24-AUT_CA_1#subjects)

Hawkesbury

On-site

Subject Contact Graham Jones (https://directory.westernsydney.edu.au/search/name/Graham Jones/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=BIOS2018_24-AUT_HW_1#subjects)

Parramatta - Victoria Rd

On-site

Subject Contact Graham Jones (https://directory.westernsydney.edu.au/search/name/Graham Jones/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=BIOS2018_24-AUT_PS_1#subjects)