BIOS 7001 EMERGING TECHNOLOGIES FOR BIOLOGICAL SCIENCE

Credit Points 10

Legacy Code 800186

Coordinator Chris Cazzonelli (https://directory.westernsydney.edu.au/search/name/Chris Cazzonelli/)

Description This unit serves to enhance the technological education and training for students undertaking research in biological, agricultural and medical sciences. The unit will teach current and emerging technologies utilised in biological investigations with a focus on model species of animals, plants, insects and microorganisms. The unit is structured around emerging technologies in research fields of: 1) whole organism physiology, 2) cell molecular biology and biochemistry, and 3) genomic and epigenomic processes encoded by the nucleus. Students will be exposed to a systems approach in order to investigate complex interactions with a view towards understanding the impacts of the environment on biological interactions. Teaching will be undertaken by Western Sydney University-HIE staff who are world leaders in their respective research fields.

School Graduate Research School

Discipline Biological Sciences

Student Contribution Band HECS Band 2 10cp

Level Postgraduate Coursework Level 7 subject

Restrictions

Students must be enrolled in the Bachelor of Research Studies/ Master of Research.

Assumed Knowledge

Students should have an undergraduate degree in Biology, Environmental Science, Medical Science, or Agricultural Science, with a background in biological sciences, including some knowledge of molecular biology, genetics, biochemistry and/or physiology.

Learning Outcomes

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

1. Critically discuss research articles and describe technologies using in biological research investigations.
2. Utilise an interdisciplinary systems approach to investigate biological processes.
3. Describe core technologies used in physiology, biochemistry or molecular biology.
4. Apply new technologies in practical biological research investigations.
5. Interpret and analyse data obtained from ﷺeomics technologies using commercial software.
6. Conduct investigations safely and ethically in a laboratory using experimental methodology.
7. Use spreadsheets, statistical and analytical programs to enter, analyse and graph data as well as draw appropriate conclusions from data.
8. Communicate findings correctly in oral or in written form using an appropriate style, as well as access the scientific literature to place research findings in a publication context.

Subject Content

Tools for Phenotyping and Studying Physiological Processes
1. Whole organism imaging, confocal microscopy and microelectrode techniques
2. Principles of fluorescence, gas exchange and stable isotopes analysis
3. Techniques for measuring carbon budgets
Molecular and Biochemical Methods
4. Methods to quantify gene expression and protein abundance or activity
5. Metabolomics: tools to quantify and identify primary and secondary metabolites
6. Genetic engineering, genome editing and modification of organism traits
High Throughput Genetic and Epigenetic Technologies
7. Next generation sequencing and genomic applications
8. Genotype by sequencing and gene capture techniques
9. Deciphering the epigenome: DNA methylation, chromatin modification and RNA silencing

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.

Item	Length	Percent	Threshold	Individual/ Group Task
Quiz	60 minutes per quiz - 20 questions	30	Y	Individual
Report	2500 words including figures and tables (excluding references)	40	Y	Individual
Final exam	2 hours	30	Y	Individual

Teaching Periods