UNSW Course Outline

BEES5041 Data Analysis: Environmental Science & Management - 2024

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General Course Information

Course Code : BEES5041
Year : 2024
Term : Term 1
Teaching Period : T1
Is a multi-term course? : No
Faculty : Faculty of Science
Academic Unit : School of Biological, Earth and Environmental Sciences
Delivery Mode : Multimodal
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Development of skills in applying statistics to biological, earth and spatial data; design and

analysis of experiments in life and earth sciences; sampling strategies for estimating sample size; analysis of community and environment structure using multivariate statistics; simulation modelling in population biology, and statistical fitting of non-linear models to population growth data; correlation and both simple and multiple regression; improving statistical models using analysis of residuals; analysis of spatial data. Examples are drawn from ecological, geographical, earth, behavioural, and genetic and immunological data. Practical work emphasis on problem-solving and hands-on experience with EXCEL, MINITAB and other specialist software.

Assumed knowledge: MATH1041 or relevant undergraduate level of statistical analysis.

Course Aims

The aim of the course (BEES5041) is the development of skills in:
- applying statistical methods to biological, earth and spatial data with emphasis on marine science and management
- the design of sampling and experimental research
- interpretation and communication of statistical results

The course will be based on a series of worked examples from a wide variety of disciplines, and practical work emphasises problem-solving and hands-on experience with EXCEL, MINITAB and other specialist software.

The course is designed to provide students with skills in performing a variety of statistical tests and in recognising when to apply which statistical test. A number of different types of tests will be covered and at the end of the course you will be expected to know how and when to apply each of these tests. We will cover a suite of tests that are relevant to most areas of life, earth and environmental sciences.

Relationship to Other Courses

This course runs along with BEES2041, an udnergarudate course of the same name. We have found the content well suited, to build the skills and confiednce of our postgarduates in data analaysis.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Outline the logical process involved in hypothesis testing
CLO2 : Identify appropriate statistical tests for a given sampling or experimental design, execute and interpret the results of such tests
CLO3 : Conduct and interpret contingency table analyses
CLO4 : Explain and test the assumptions of linear models (regression, ANOVA), and outline appropriate options if assumptions are violated
CLO5 : Outline the logical process of conducting, interpreting and reporting results from linear models, and calculate the key components of these
CLO6 : Interpret figures and statistical output derived from multivariate analyses (cluster analyses, MDS, PCA)
CLO7 : Communicate the results of experiments or sampling exercises with appropriate integration of text, figures and statistical support for results.

Course Learning Outcomes	Assessment Item
CLO1 : Outline the logical process involved in hypothesis testing	• Practical Report 1 • Practical Report 2 • Practical Report 3 • Final Exam
CLO2 : Identify appropriate statistical tests for a given sampling or experimental design, execute and interpret the results of such tests	• Practical Report 1 • Practical Report 2 • Practical Report 3 • Final Exam
CLO3 : Conduct and interpret contingency table analyses	• Practical Report 1 • Final Exam
CLO4 : Explain and test the assumptions of linear models (regression, ANOVA), and outline appropriate options if assumptions are violated	• Practical Report 2 • Practical Report 3 • Practical Report 1 • Final Exam
CLO5 : Outline the logical process of conducting, interpreting and reporting results from linear models, and calculate the key components of these	• Practical Report 2 • Practical Report 3 • Practical Report 1 • Final Exam
CLO6 : Interpret figures and statistical output derived from multivariate analyses (cluster analyses, MDS, PCA)	• Practical Report 3 • Final Exam
CLO7 : Communicate the results of experiments or sampling exercises with appropriate integration of text, figures and statistical support for results.	• Practical Report 2 • Practical Report 1 • Practical Report 3 • Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Echo 360

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Practical Report 1 Assessment Format: Individual	10%	
Practical Report 2 Assessment Format: Individual	25%	
Practical Report 3 Assessment Format: Individual	30%	
Final Exam Assessment Format: Individual	35%	

Assessment Details

Practical Report 1

Assessment Overview

This report is based on practical material covered during the labs in weeks 1-3. Students are required to conduct and interpret of statistical tests run in the practical classes, and they are assessed on their ability to perform these tasks correctly. Feedback from academic staff is provided within two weeks of submission, in the form of marks and written comments.

Course Learning Outcomes

- CLO1 : Outline the logical process involved in hypothesis testing
- CLO2 : Identify appropriate statistical tests for a given sampling or experimental design, execute and interpret the results of such tests
- CLO3 : Conduct and interpret contingency table analyses
- CLO4 : Explain and test the assumptions of linear models (regression, ANOVA), and outline appropriate options if assumptions are violated
- CLO5 : Outline the logical process of conducting, interpreting and reporting results from linear models, and calculate the key components of these
- CLO7 : Communicate the results of experiments or sampling exercises with appropriate integration of text, figures and statistical support for results.

Practical Report 2

Assessment Overview

This report is based on practical material covered during the labs, and and independent analysis

of a data set provided. Students are required to conduct and interpret of statistical tests run in the practical classes, and they are assessed on their ability to perform these tasks correctly. They are also assessed on their ability to effectively communicate results of their analyses of data provided. Feedback from academic staff is provided within two weeks of submission, in the form of marks and written comments.

Course Learning Outcomes

- CLO1 : Outline the logical process involved in hypothesis testing
- CLO2 : Identify appropriate statistical tests for a given sampling or experimental design, execute and interpret the results of such tests
- CLO4 : Explain and test the assumptions of linear models (regression, ANOVA), and outline appropriate options if assumptions are violated
- CLO5 : Outline the logical process of conducting, interpreting and reporting results from linear models, and calculate the key components of these
- CLO7 : Communicate the results of experiments or sampling exercises with appropriate integration of text, figures and statistical support for results.

Practical Report 3

Assessment Overview

This report is based on practical material covered during the labs, and analyses of data collected during the field trip. Students are required to conduct and interpret of statistical tests run in the practical classes, and they are assessed on their ability to perform these tasks correctly. They are also assessed on their ability to effectively communicate results of the data collected from field trip. Feedback from academic staff is provided within two weeks of submission, in the form of marks and written comments.

Course Learning Outcomes

- CLO1 : Outline the logical process involved in hypothesis testing
- CLO2 : Identify appropriate statistical tests for a given sampling or experimental design, execute and interpret the results of such tests
- CLO4 : Explain and test the assumptions of linear models (regression, ANOVA), and outline appropriate options if assumptions are violated
- CLO5 : Outline the logical process of conducting, interpreting and reporting results from linear models, and calculate the key components of these
- CLO6 : Interpret figures and statistical output derived from multivariate analyses (cluster analyses, MDS, PCA)
- CLO7 : Communicate the results of experiments or sampling exercises with appropriate integration of text, figures and statistical support for results.

Final Exam

Assessment Overview

The final exam assesses student comprehension of all material covered in lectures and practical classes

Course Learning Outcomes

- CLO1 : Outline the logical process involved in hypothesis testing
- CLO2 : Identify appropriate statistical tests for a given sampling or experimental design, execute and interpret the results of such tests
- CLO3 : Conduct and interpret contingency table analyses
- CLO4 : Explain and test the assumptions of linear models (regression, ANOVA), and outline appropriate options if assumptions are violated
- CLO5 : Outline the logical process of conducting, interpreting and reporting results from linear models, and calculate the key components of these
- CLO6 : Interpret figures and statistical output derived from multivariate analyses (cluster analyses, MDS, PCA)
- CLO7 : Communicate the results of experiments or sampling exercises with appropriate integration of text, figures and statistical support for results.

General Assessment Information

Grading Basis

Standard

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Text Books: Students will benefit in reading from any of the following:

1. Warton 2022. *Statistics explained. Eco-Stats: Data Analysis in Ecology: From t-tests to Multivariate Abundances.* Available electronically from UNSW library or via this link while on campus, and in print from UNSW bookshop.
2. Moore 2021. *Introduction to the Practice of Statistics 10e Int.* (Also used in Math 1041). Available from UNSW library and UNSW bookshop.

Environmental Computing: In this course, you will be introduced to some of the techniques needed for for visualising and analysing data, but you will often need to refresh those skills and gain new ones to do well in your other subjects. To address the issues of 1) undergraduate students needing a place to get help with quantitative skills, and 2) effective sharing of skills among research students, we have developed a web site, Environmental Computing, to help you throughout your degree.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Daniel Falster		E8C 5112	9065 9519	By appointment	Yes	Yes
Lecturer	Alistair Poore		D26 520E	+61 2 9065 5566	By appointment	No	No

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the UNSW Student Code of Conduct Website.

Academic Honesty and Plagarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.
Further information about referencing styles can be located at https://student.unsw.edu.au/

referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.
Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The Current Students site,
- The ELISE training site, and
- The Use of AI for assessments site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student

email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: https://student.unsw.edu.au/special-consideration

Important note: UNSW has a "fit to sit/submit" rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- The Current Students Gateway
- Student Support
- Academic Skills and Support
- Student Wellbeing, Health and Safety
- Equitable Learning Services
- UNSW IT Service Centre
- Science EDI Student Initiatives, Offerings and Guidelines