

Subject Information Guide

STAT 906 Experimental Design

Semester 2, 2015

Administration and contact details

Host Department	School of Mathematics and Applied Statistics
Host Institution	University of Wollongong
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Subject details

	Click here to enter text.
Subject homepage URL	https://sols.uow.edu.au/owa/sid/CAL.SUBJECTINFO?p_subcode=STAT906&p_year=2013&p_source=WebCMS
Honours student hand-out URL	n/a
Start date:	27/7/2015
End date:	30/10/2015
Contact hours per week:	2 hours
Lecture day and time:	Thursday 8:30 – 10:30.
Description of electronic access arrangements for students (for example, WebCT)	To be arranged as needed

Subject content

1. Subject content description

The design of comparative experiments is the cornerstone of much research undertaken in medical, biological and agricultural

sciences. The aim of this course is, given a proposal for an experiment, to be able to ask pertinent questions about the aims of the experiment, the treatments and their structure, the experimental units and the inter-relationship between the experimental units and the treatments. We will also examine issues such as replication, data recording, costs and resources and be able to undertake an appropriate analysis of designed experiments using linear mixed models. All computing will be undertaken in the R statistical computing environment using the ASReml-R and od packages.

2. Week-by-week topic overview

Chapters 1 to 7 of the text will be covered with approximately one chapter covered per week.

3. Assumed prerequisite knowledge and capabilities

Statistical distribution theory; fundamentals of statistical inference; linear models; matrix and linear algebra

4. Learning outcomes and objectives

AQF specific Program Learning Outcomes and Learning Outcome Descriptors (if available):

AQF Program Learning Outcomes addressed in this subject	Associated AQF Learning Outcome Descriptors for this subject
Have a thorough understanding of the basic notation, concepts and protocols for designing and conducting a comparative experiment	K1, K2 S1, S2, S3
Be able to construct a suitable design, including randomization of the design	K1, K2 S1, S2, S3
Have a thorough understanding of the linear model(s) used for the analysis of a comparative experiment	K1, K2 S1, S2, S3
Have a thorough understanding of the concept of <i>strata</i> and be able to formulate the skeletal ANOVA table	K1, K2 S1, S2, S3
Have a thorough understanding of the connection between the analysis of a comparative experiment using the ANOVA	K1, K2 S1, S2, S3

approach and the use of linear mixed models with residual maximum likelihood (REML) estimation of variance parameters and Wald tests for inference concerning fixed effects.

Learning Outcome Descriptors at AQF Level 8

Knowledge

K1: coherent and advanced knowledge of the underlying principles and concepts in one or more disciplines

K2: knowledge of research principles and methods

Skills

S1: cognitive skills to review, analyse, consolidate and synthesise knowledge to identify and provide solutions to complex problem with intellectual independence

S2: cognitive and technical skills to demonstrate a broad understanding of a body of knowledge and theoretical concepts with advanced understanding in some areas

S3: cognitive skills to exercise critical thinking and judgement in developing new understanding

S4: technical skills to design and use in a research project

S5: communication skills to present clear and coherent exposition of knowledge and ideas to a variety of audiences

Application of Knowledge and Skills

A1: with initiative and judgement in professional practice and/or scholarship

A2: to adapt knowledge and skills in diverse contexts

A3: with responsibility and accountability for own learning and practice and in collaboration with others within broad parameters

A4: to plan and execute project work and/or a piece of research and scholarship with some independence

5. Learning resources

Bailey, R. (2008). Design of comparative experiments. Cambridge University Press

Additional notes on linear mixed models will be provided. You are encouraged to purchase the text book, or at least download relevant chapters of the text from <http://www.maths.qmul.ac.uk/~rab/DOEbook/>

Software required: R and ASReml-R package.

6. Assessment

Exam/assignment/classwork breakdown					
Exam	60%	Assignment	40%	Class work	
Assignment due dates		1 assignment per week for approximately 10 weeks	See left	n/a	n/a
Approximate exam date				To be notified by the coordinator	

Institution Honours program details

Weight of subject in total honours assessment at host department	12.5%
Thesis/subject split at host department	Depends on degree: either 25% or 37.5%
Honours grade ranges at host department:	
H1	85-110
H2a	75-84
H2b	65-74
H3	50-64