

Module Code	STU34501																																										
Module Name	Applied Linear Statistical Methods 1																																										
ECTS Weighting 1	5 ECTS																																										
Semester taught	Semester 1																																										
Module Coordinator/s	Dr. Jason Wyse																																										
Module Learning Outcomes	<p>On successful completion of this module, students will be able to:</p> <ul style="list-style-type: none">LO1. Derive least squares estimators for a linear regression modelLO2. Derive and use properties of least squares estimators for inferenceLO3. Extend the linear model to the general linear model (ANOVA, polynomial regression) including use of dummy variablesLO4. Carry out model diagnostics through analysis of residualsLO5. Form a Bayesian linear model and appreciate connections with ridge regressionLO6. Understand that regularisation can be used for model determination through the LASSO																																										
Module Content	Working with linear and generalised linear models is an essential part of a data analyst’s work. This module presents the theory of the linear model and links this with the use of this theory in practice through examples in R. Diagnosing the fit (and hence appropriateness) of a model through residual analysis is discussed. The final part of the module looks at the more modern topic of regularisation. This is motivated first through looking at the Bayesian linear model, then model determination through the LASSO is discussed.																																										
Teaching and Learning Methods	Lectures 3 classes per week. Some of these classes will be used as tutorials.																																										
Assessment Details 2	<table><tr><th>Assessment Component</th><th>Brief Description</th><th>Learning Outcomes Addressed</th><th>% of total</th><th>Week set</th><th>Week due</th></tr><tr><td>Examination</td><td>2 hour written examination</td><td>LO1, LO2, LO3, LO4, LO5, LO6</td><td>90%</td><td>n/a</td><td>n/a</td></tr><tr><td>Assignments</td><td>Four assignments throughout the semester</td><td>LO1, LO2, LO3, LO4, LO5, LO6</td><td>10%</td><td>3, 5, 7, 9</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	Assessment Component	Brief Description	Learning Outcomes Addressed	% of total	Week set	Week due	Examination	2 hour written examination	LO1, LO2, LO3, LO4, LO5, LO6	90%	n/a	n/a	Assignments	Four assignments throughout the semester	LO1, LO2, LO3, LO4, LO5, LO6	10%	3, 5, 7, 9																									
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¹ [TEP Glossary](#)

² [TEP Guidelines on Workload and Assessment](#)

Reassessment Details	Examination (2 hours, 100%)	
Contact Hours and Indicative Student Workload	Contact Hours (scheduled hours per student over full module), broken down by:	33 hours
	lecture	29 hours
	laboratory	0 hours
	tutorial or seminar	4 hours
	other	0 hours
	Independent study (outside scheduled contact hours), broken down by:	82 hours
	preparation for classes and review of material (including preparation for examination, if applicable)	42 hours
	completion of assessments (including examination, if applicable)	40 hours
	Total Hours	115 hours
Recommended Reading List	Applied Linear Statistical Models, Michael Kutner, Christopher Nachtsheim, John Neter and William Li, McGraw-Hill/Irwin	
	Pattern Recognition and Machine Learning, Christopher Bishop, Springer	
	Computer Age Statistical Inference, Algorithms, Evidence and Data Science, Bradley Efron and Trevor Hastie, Cambridge University Press	
Module Pre-requisites	Prerequisite modules: ST2351 Other/alternative non-module prerequisites: Basic R programming will be useful.	
Module Co-requisites		
Module Website		
Last Update	24/06/2019 by Jason Wyse	