

Module Code	STU34508																																				
Module Name	Statistical Inference 2																																				
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. Use moment generating functions to understand sums of iid random variablesLO2. Derive method of moments and maximum likelihood estimatorsLO3. Describe the properties of an estimator using bias and mean square errorLO4. Derive approximate sampling distributions for maximum likelihood estimatorsLO5. Construct confidence intervals for unknown parametersLO6. Construct tests of hypothesis of unknown parameters																																				
Module Content	<p>This module provides an overview of key topics in classical statistical theory. It begins with the study of sums of independent and identically distributed random variables, proceeding to a proof of the Central Limit Theorem using moment generating functions. Estimation of the parameters of statistical models based on observed data is then dealt with. The method of moments and maximum likelihood are examined. Properties of the estimators these methods produce are defined and explored. The Central Limit Theorem proved earlier is used to derive asymptotic properties of maximum likelihood estimators. Throughout the module, the basic inferential techniques of constructing confidence intervals and conducting hypothesis tests are revisited, and then discussed formally at the end.</p>																																				
Teaching and Learning Methods	<p>Lectures 3 classes per week. Some of these classes will be used as tutorials.</p>																																				
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></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	<table><tr><td>Contact Hours (scheduled hours per student over full module), broken down by:</td><td>33 hours</td></tr><tr><td> lecture</td><td>29 hours</td></tr><tr><td> laboratory</td><td>0 hours</td></tr><tr><td> tutorial or seminar</td><td>4 hours</td></tr><tr><td> other</td><td>0 hours</td></tr><tr><td>Independent study (outside scheduled contact hours), broken down by:</td><td>82 hours</td></tr><tr><td> preparation for classes and review of material (including preparation for examination, if applicable)</td><td>42 hours</td></tr><tr><td> completion of assessments (including examination, if applicable)</td><td>40 hours</td></tr><tr><td>Total Hours</td><td>115 hours</td></tr></table>					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
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Recommended Reading List	<p>Statistical Inference (second edition), George Casella and Roger Berger, Duxbury Press</p> <p>Introduction to the Theory of Statistics, Alexander Mood, Franklin Graybill and Duane Boes, McGraw Hill</p> <p>Computer Age Statistical Inference, Algorithms, Evidence and Data Science, Bradley Efron and Trevor Hastie, Cambridge University Press</p>																						
Module Pre-requisites	<p>Prerequisite modules: ST2351</p> <p>Other/alternative non-module prerequisites: R will be used at some points throughout the module to demonstrate module concepts. Some prior knowledge will be useful.</p>																						
Module Co-requisites																							
Module Website																							
Last Update	24/06/2019 by Jason Wyse																						