School of Information and Physical Sciences

STAT1070: Statistics for the Sciences

Callaghan

Summer 2 - 2024

COURSE OUTLINE

OVERVIEW

Course Description

How do we use data to make informed scientific decisions? This course introduces students to statistical thinking, data collection, data presentation and statistical analysis. Examples from a range of science related disciplines are used to illustrate the key concepts.

Although the emphasis is on applied data analysis rather than statistical theory, the course also provides an appropriate introduction for those students who intend to study statistics at a higher level.

Interested in studying further statistics courses to develop your skills and improve your employability? Information about available statistics courses can be found here: https://www.newcastle.edu.au/school/mathematical-and-physical-sciences/study/statistics-courses

Assumed Knowledge

Students who are not confident with their mathematics background are advised to complete MATH1001 Preparatory Studies in Mathematics before enrolling in STAT1070.

Note: Knowledge of calculus and matrices is not required.

Contact Hours

Computer Lab
Face to Face On Campus
1 hour(s) per week(s) for 13 week(s) starting Week 1
Summer offering: 2 or 3 1-hour Computer Labs per Week for a total of 11 Computer Labs across the Full Term.

Lecture
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1
Summer offering: 2 or 3 2-hour Lecture recordings per Week for a total of 12 Lectures across the Full Term.

Tutorial
Face to Face On Campus
1 hour(s) per week(s) for 13 week(s) starting Week 1
Summer offering: 2 or 3 1.5-hour Tutorials per Week for a total of 11 Tutorials across the Full Term.

Unit Weighting
10

Workload
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan
Dr Yang Yang

Yang.Yang10@newcastle.edu.au
(02) 4921 8622
Consultation: To be advised on Canvas

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office

School of Information and Physical Sciences
SR233, Social Sciences Building
Callaghan
CESE-SIPS-Admin@newcastle.edu.au
+61 2 4921 5513
9am-5pm (Mon-Fri)

SYLLABUS

Course Content

- Introduction & overview of statistics in the sciences
- Understanding variation and describing univariate data
- Understanding bivariate relationships
- Collecting data - surveys and experiments
- Probability concepts
- Statistical inference hypothesis tests and confidence intervals
- Simple bivariate statistical models including regression and ANOVA

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Describe the role of statistics in developing scientific knowledge.

2. Explain how probability and sampling concepts relate to statistical analysis of data.

3. Apply basic principles of experimental design when collecting data.

4. Analyse data using common statistical software and interpret results to solve science related problems.

Course Materials

Other Resources:

- The statistical software jamovi is available in the university computing laboratories and will be used for computer labs and assignments. This software is available in open-access areas, such as in the libraries, student hubs, and many other buildings on campus with computer labs. You can also download the software for free to use on your personal computers at home or on campus.

Recommended Text:

- David M. Dies, Christopher D. Barr, Mine Cetinkaya, OpenIntro Statistics, 4th edition, OpenIntro, 2019. This text is available at https://www.openintro.org/stat/textbook.php

Required Reading:

- The course notes are available on Canvas.

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	15 Jan	Topic 1: Course administration (Jan 15) Topic 1: Data, Graphs, and Jamovi (Jan 15) Topic 2: Descriptive Statistics (Jan 17) Topic 3: Experimental Design and Probability (Jan 18)	Tutorial 1, Lab 1 (Jan 15) Tutorial 2, Lab 2 (Jan 17) Tutorial 3, Lab 3 (Jan 18)	Online Quiz 1 (Jan 18)
2	22 Jan	Topic 4: Probability and Random Variables (Jan 22) Topic 5: Probability Distributions (Jan 24) Topic 6: Statistical Inference (Jan 25)	Tutorial 4, Lab 4 (Jan 22) Tutorial 5, Lab 5 (Jan 24) Tutorial 6, Lab 6 (Jan 25)	Online Quiz 2 (Topics 34, due Jan 23) Online Quiz 3 (Topics 56, due Jan 26)
3	29 Jan	Mid Semester Test (Jan 29) Topic 7: Testing means (Jan 31) Topic 8: Comparing means (Feb 1)	No Lab on Jan 29 Tutorial 7, Lab 7 (Jan 31) Tutorial 8, Lab 8 (Feb 1)	Mid Semester Test (Topics 1-5, Jan 29 in class) Online Quiz 4 (Topics 78, due Feb 2)
4	5 Feb	Topic 9: Regression (Feb 5) Topic 10: Proportions (Feb 7) Topic 11: Chi square tests (Feb 8) Optional Revision Session (Feb 8)	Tutorial 9, Lab 9 (Feb 5) Tutorial 10, Lab 10 (Feb 7) Tutorial 11, Lab 11 (Feb 8)	Online Quiz 5 (Topic 9, due Feb 6) Online Quiz 6 (Topics 10-11, due Feb 9) Assignment (due Feb 11)
Examination Period				End of Semester Quiz (date to be advised) Final Exam (date to be advised)

ASSESSMENTS

This course has 5 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Assignment	11:59pm Sunday, Feb 11	Individual	15%	1, 2, 3, 4
2	Examination	Final Exam Period	Individual	40%	1, 2, 3, 4
3	Online Quiz (x6)	Online Quiz 1: 11:59pm on Jan 18 Online Quiz 2: 11:59pm on Jan 23 Online Quiz 3: 11:59pm on Jan 26 Online Quiz 4: 11:59pm on Feb 2 Online Quiz 5: 11:59pm on Feb 6 Online Quiz 6: 11:59pm on Feb 9	Individual	25%	1, 2, 3, 4
4	Mid Semester Test	In class during Week 3 (Jan 29)	Individual	10%	1, 2, 3, 4
5	End of Semester Quiz	Final Exam Period (due date to be advised)	Individual	10%	1, 2, 3, 4

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Quizzes: Due to the need to make feedback and results available in a timely manner, quizzes will not be able to be submitted two days after the due date. Quizzes can be submitted late and before two days after the due date with no late penalty. In this case there is no need to apply for adverse circumstances. The quiz results and feedback will be automatically released after three days following the due date, therefore no attempts under any circumstances will be allowed once the solutions and feedback are available.

Assignments: Assignments submitted late will incur a late penalty. The assignment solutions will be made available three days after the due for students to access feedback on what was required. Therefore, no assignments will be accepted later than three days following the due date.

If you require an extension of length greater than three days, you may apply for adverse circumstances and an alternative assessment may be arranged.

Assessment 1 - Assignment

Assessment Type Written Assignment
Description The written assignment provides students with an opportunity to apply appropriate statistical methods to given problems and scenarios. It is designed to enable students to apply skills, developed in the tutorials and labs based on content in the lectures, which will be used throughout their program and careers.

Students will apply what they have learned to demonstrate knowledge of various statistical concepts, including the use of jamovi and other software to complement analysis.
Weighting 15%
Due Date 11:59pm Sunday, Feb 11
Submission Method Online
Electronically via Canvas
Assessment Criteria Criteria will be provided via Canvas.
Return Method Online
Feedback Provided Online

Assessment 2 - Examination

Assessment Type Formal Examination
Description Consists of 3 written answer questions. These questions provide you with statistical software output and you should use the output to answer the questions provided.
Weighting 40%
Due Date Final Exam Period
Submission Method Formal Exam
Assessment Criteria Criteria will be provided via Canvas.
Return Method Not Returned
Feedback Provided No Feedback

Assessment 3 - Online Quiz (x6)

Assessment Type Quiz
Description Each online quiz consists of 10 multiple choice style questions.
Students are allowed up to 60 minutes to complete the quiz, but should be able to complete it within 30 minutes.

These six quizzes are designed to test knowledge of lecture, tutorial and lab materials and help students maintain engagement with the course. The online nature of the quizzes facilitates timely feedback on student learning; this, coupled with the regularity of testing, enables students to self-assess their methods of studying and learning the course materials, and adjust practices as necessary in preparation for future quizzes and assessments.

The quizzes highlight any areas where students may require further development or new approaches to learning which should stimulate discussion with tutors and lecturers.

An individual student's best 5 scores of the 6 quizzes attempted will be used for the final score which contributes 25% to the course. Thus each quiz is effectively worth 5% of the course grade.
Weighting 25%
Due Date Online Quiz 1: 11:59pm on Jan 18
Online Quiz 2: 11:59pm on Jan 23
Online Quiz 3: 11:59pm on Jan 26
Online Quiz 4: 11:59pm on Feb 2
Online Quiz 5: 11:59pm on Feb 6
Online Quiz 6: 11:59pm on Feb 9
Submission Method Online
Assessment Criteria Correct selection (multiple choice, multiple answer, matching) for each question.

Return Method Online
Feedback Provided Online - Correct answers and feedback shown after all deadlines have passed.

Assessment 4 - Mid Semester Test

Assessment Type In Term Test
Description The mid semester test will cover the material from Topics 1 to 5 inclusive.
Weighting 10%
Due Date In class during Week 3 (Jan 29)
Submission Method In Class
Assessment Criteria Criteria will be provided via Canvas.
Return Method Not Returned
Feedback Provided No Feedback

Assessment 5 - End of Semester Quiz

Assessment Type Quiz
Description The End of Semester Quiz covers all of the material from Topics 1 to 11 inclusive.
Weighting 10%
Due Date To be advised on Canvas
Submission Method Online
Assessment Criteria Criteria will be provided via Canvas.
Return Method Not Returned
Feedback Provided No Feedback

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Attendance

Attendance/participation will be recorded in the following components:

- Computer Lab (Method of recording: Method of recording: UoN Attendance Application)
- Tutorial (Method of recording: Method of recording: UoN Attendance Application)

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content

or announcements on the Canvas course site.

- Email: Students will receive communications via their student email account.

Students should check UoNline regularly for announcements affecting the whole course.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.