

STAT2110: Engineering Statistics

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description Statistics provides us with a quantitative framework to utilise data for describing, summarising, and modelling the world around us. Engineering statistics combines engineering and statistics using scientific methods for analysing data. This course introduces students to the fundamental concepts of probability, random variables and their distributions, and shows how these ideas provide the theoretical foundation for data analysis through statistical modelling, estimation and hypothesis testing with a major emphasis on applications in electrical engineering and computer systems. On completion of this course students will be able to apply statistical theory to make informed decisions and predictions relevant to engineering.

Academic Progress Requirements Nil

Requisites This course has similarities to STAT1300 and STAT2010. If you have successfully completed STAT1300 or STAT2010 you cannot enrol in this course.

Assumed Knowledge MATH1110 Mathematics for Engineering, Science and Technology 1
OR
MATH1120 Mathematics for Engineering, Science and Technology 2
OR
MATH1210 Mathematical Discovery 1
OR
MATH1220 Mathematical Discovery 2
Knowledge of and experience in Python

Contact Hours

**Callaghan
Computer Lab**
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 2

Lecture
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

Tutorial
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

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

COURSE OUTLINE

CONTACTS

Course Coordinator **Callaghan**
Dr Kirill Glavatskiy
Kirill.Glavatskiy@newcastle.edu.au
Consultation: TBA 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 The course will include the following topics:

- Sample space, events, axioms of probability and Bayes' theorem
- Random variables and their distributions: Univariate
- Expected values and their properties
- Functions of random variables
- Vector and matrix calculations
- Random vectors and joint distributions: Multivariate
- Samples, sampling distributions and Central Limit Theorem
- Hypothesis testing
- Estimation
- Simple linear regression models
- Monte Carlo Simulation

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Explain the basic concepts underlying probability and hypothesis testing.
2. Explain the underlying assumptions and the applicability of each of the approaches studied.
3. Apply statistical models and statistical concepts including probability and hypothesis testing to solve engineering problems.
4. Apply linear algebra concepts and methods to statistical models.
5. Demonstrate an enhanced analytical ability.

Course Materials With the exception of the following texts, all course materials will be provided to students via Canvas.

Required Text:
R.E. Walpole, R.H. Myers, S.L. Myers and K.E. Ye, Probability & Statistics for Engineers & Scientists, Pearson, 9 Global Ed., U.K., 2017

Recommended Text:
J.L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning, 9 Ed., Boston, 2016.
D.C. Montgomery, G.C. Runger and N.F. Hubele, Engineering Statistics, Wiley, 5 Ed., New York, 2010.

SCHEDULE

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Quizzes	Quizzes will be open for a limited time during Weeks 3, 6, 9, and 12	Individual	40%	1, 2, 3, 4, 5
2	Written Assessment	Weeks 5 and 8	Individual	20%	1, 2, 3, 4, 5
3	Examination	Formal Examination Period	Individual	40%	1, 2, 3, 4, 5

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.

Assessment 1 - Quizzes

Assessment Type Quiz
Description Four quizzes. Each quiz is worth 10 % of the total mark
Weighting 40%
Due Date Quizzes will be open for a limited time during Weeks 3, 6, 9, and 12
Submission Method Online
Assessment Criteria Criteria will be provided via Canvas
Return Method Online
Feedback Provided Online - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Written Assessment

Assessment Type Written Assignment
Description Two reports. Each Assignment is worth 10 % of the total mark
Weighting 20%
Due Date Weeks 5 and 8
Submission Method Online
Assessment Criteria Criteria will be provided via Canvas
Return Method Online
Feedback Provided In Class - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Examination

Assessment Type Formal Examination
Description Consists of written-answer questions
Weighting 40%
Due Date Formal Examination Period
Submission Method Formal Exam
Assessment Criteria Criteria will be provided via Canvas
Return Method Not Returned
Feedback Provided No Feedback - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

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).

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.
- Face to Face: Communication will be provided via face to face meetings or supervision.

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.

Other Information

1. The teaching/assessment schedule is subject to change. Changes will be posted on Canvas LMS.
2. Detailed assessment criteria for written assignments and any additional material will be available on the Canvas site no less than two weeks prior to the due date of each assessment.
3. All assignments must be done and submitted individually.
4. Examination details and conditions will be provided separately

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.

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