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| Faculty of Science**School of Mathematical and Physical Sciences** |  |
| **STAT Honours Course: Distribution** CallaghanSemester 1 - 2020 |
|  | CRICOS Provider 00109J |
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| **OVERVIEW** |
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| **Course Description** | This course investigates statistical distributions, including systems of distributions. It covers measures of distributional shape, estimation methods and their properties, and the role of distributions in theory and practice. |

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| **Assumed Knowledge** |

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| STAT2010 and STAT3010 |
| **Callaghan****Lecture**Face to Face On Campus2 hour(s) per Week for Full Term |

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| **Contact Hours** | **Callaghan****Lecture**Face to Face On Campus2 hour(s) per Week for 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. |

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| **CONTACTS** |
| **Course Coordinator** | **Callaghan**Dr Robert KingSR 1.134921 5548Robert.king@newcastle.edu.auConsultation: TBA |
| **Teaching Staff** | Dr Robert King |
| **School Office** | **School of Mathematical and Physical Sciences**SR233, Social Sciences Building Callaghan+61 2 4921 5515 (MATHS)+61 2 4921 5513 (PHYSICS & STATISTICS)Science-MAPS-Admin@newcastle.edu.au9am-5pm (Mon-Fri) |
| **SYLLABUS** |
| **Course Content** | * Location & Scale
* Shape
* Measures of shape – Moments, L-Moments, Quantile-based
* Characterisation of distributions
* Well-known distributions, continuous and discrete
* Systems of distributions
* Quantile Function and density quantile function
* Quantile-defined distributions
* Estimation methods
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| **Course Learning Outcomes** | **On successful completion of this course, students will be able to:**1. Describe distributional shape and characterise distributions;2. Use a wide range of distributions and systems of distributions;3. Estimate parameters of distributions from data and approximate distributions with other distributions. |
| **Course Materials** | **Other Resources:*** We will be using R as the software for describing some of the concepts in the course.  It is available in all university computer labs.  It is strongly recommended that you install it on your own computer.

**Recommended Reading:*** Casella, George and Berger, Roger L. (2002), *Statistical Inference*, (2 Ed), Duxbury. ISBN 9780534243128
* Gilchrist, Warren (2000), *Statistical Modelling with Quantile Functions*, CRC Press ISBN 9781584881742
* Norman L. Johnson, Samuel Kotz, N. Balakrishnan (1995) *Continuous Univariate Distributions,* Wiley 0471584959 vol 1, 0471584940 vol 2  [**519.24 JOHN 1995**](https://library.newcastle.edu.au/search~S16?/c519.24+JOHN+1995/c519.24+john+1995/-3,-1,,B/browse)
* Norman L. Johnson, (2005) *Univariate Discrete Distributions* Wiley (available online through library [https://library.newcastle.edu.au/record=b3620961~S16](https://library.newcastle.edu.au/record%3Db3620961~S16)

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| **SCHEDULE**

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| **Week** | **Week Begins** | **Topic** | **Learning Activity** | **Assessment Due** |
| **1** | 19 July | Distributions, Continuous & Discrete, f, F, Q, Definition of quantile, software issues | Lecture |  |
| **2** | 26 July | EstimationFamous distributions, continuous:Gamma, Pareto | Lecture |  |
| **3** | 2 Aug | Famous Distributions: Discrete | Lecture | Assignment 1 due |
| **4** | 9 Aug | Location, Scale & ShapeMoment MeasuresL-MomentsQuantile Measures | Lecture |  |
| **5** | 16 Aug | Quantile density function, density quantile functionQuantile defined distributions | Lecture |  |
| **6** | 23 Aug | Student Presentations, Cauchy Distribution | Lecture | Presentation |
| **7** | 30 Aug | Systems of Distributions: Johnson Family | Lecture |  |
| **8** | 6 Sept | Pearson Family | Lecture |  |
| **9** | 13 Sept | Burr Family | Lecture | Assignment 2 due |
| **Mid Semester Break** |
| **Mid Semester Break** |
| **10** |  4 Oct  | Generalised Lambda Distribution | Lecture |  |
| **11** | 11 Oct | Estimation for GLD- moments- L-moments- MLE | Lecture |  |
| **12** | 18 Oct | Estimation for GLD- Starship- MPS- MLE- quantile matching |  |  |
| **Exam Period** |
| **Exam Period** |
| **Exam Period** |

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**ASSESSMENTS**This course has 2 assessments. Each assessment is described in more detail in the sections below.

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|  | **Assessment Name** | **Due Date** | **Involvement** | **Weighting** | **Learning Outcomes** |
| **1** | Assignment (x3) | Assignment 1 in week 3 (20%)Assignment 2 in week 10 (20%) | Individual | 40% | 1, 2, 3 |
| **2** | Presentation | Week 6 | Individual | 20% | 1, 2, 3 |
| **3** | Take-home Examination | Exam period | Individual | 40% | 1, 2, 3 |

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| **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 - Assignment (x2)** |
| **Assessment Type** | Written Assignment |
| **Purpose** | Assesses understanding of content and communication skills. |
| **Description** | The assignments include questions requiring proofs, derivations, explanations, data analysis and/or coding |
| **Weighting** | 40% |
| **Due Date** | Assignment 1 in week 3 (20%)Assignment 2 in week 10 (20%) |
| **Submission Method** | In Class / via email |
| **Assessment Criteria** | Marked on correctness, clarity of expression, demonstrated understanding and/or good coding practice. |
| **Return Method** | In Class |
| **Feedback Provided** | Returned Work - Feedback due within two weeks from submission.  |

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| **Assessment 2 - Presentation** |
| **Assessment Type** | Presentation |
| **Purpose** | Assesses communication skills and encourages independent learning |
| **Description** | An in-class presentation |
| **Weighting** | 20% |
| **Due Date** | Week 8 |
| **Submission Method** | In Class |
| **Assessment Criteria** | Assessed on the basis of content, and speaking performance. |
| **Return Method** | In Class |
| **Feedback Provided** | Oral feedback in class |

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| **Assessment 3 - Examination** |
| **Assessment Type** | Take-home Examination |
| **Purpose** | The final examination is designed to test the individual student's knowledge of the course material and their ability to describe, analyse and hypothesise from this material.  |
| **Description** | Take home exam |
| **Weighting** | 40% |
| **Due Date** | Exam Period |
| **Submission Method** | Take-Home exam |
| **Assessment Criteria** | Marked on correctness, clarity of expression, demonstrated understanding and/or good coding practice. |
| **Return Method** | Not Returned |
| **Feedback Provided** | No Feedback  |

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| **ADDITIONAL INFORMATION** |
| **Grading Scheme** | This course is graded as follows:

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| **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). |

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| **Attendance****Communication Methods** | Attendance/participation will be recorded in the following components:* Lecture (Method of recording: 2 hours per week for full term)

Communication methods used in this course include:* Blackboard Course Site: Students will receive communications via the posting of content or announcements on the Blackboard 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.
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| **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. |
| **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** | You are entitled to apply for special consideration because adverse circumstances have had an impact on your performance in an assessment item. This includes applying for an extension of time to complete an assessment item. Apply via email to the course convener in the first instance. Prior to applying you must refer to the Adverse Circumstances Affecting Assessment Items Procedure, available at https://policies.newcastle.edu.au/document/view-current.php?id=236.  |
| **Important Policy Information** | The 'HELP for Students' tab in UoNline contains important information that all students should be familiar with, including various systems, policies and procedures. |

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