



Unit outline

Name of unit
Statistical Data Analysis (BDS QTT 101)

Unit description
<p>This subject provides an introduction to modern statistical principles and practice with special emphasis on data analytical techniques. The aim of the unit is to promote an understanding of the principles and techniques involved in statistical analysis of simple data set. A number of software applications will be explored for undertaking statistical analyses. Descriptive statistics is examined and how reports are to be presented. Statistical inference techniques, such as tests of means, proportions, categorical data as well as regression and correlation, are investigated. Basic non-parametric statistics and Bayesian inference are presented.</p>

SECTION 1 – GENERAL INFORMATION (CORE)

1.1 Administrative details

Associated higher education awards (for example, Bachelor, Diploma)	Duration (for example, one semester, full year)	Level (for example, introductory, intermediate, advanced level, 1st year, 2nd year, 3rd year)	Unit coordinator
Bachelor of Data Science	3 years	1 st Year	To be confirmed

1.2 Core or elective unit

Indicate if the unit is a:

- ☒ core unit
- ☐ elective unit
- ☐ other (please specify below):

1.3 Unit weighting

Using the table below, indicate the credit point weighting of this unit and the credit point total for the course of study (for example, 10 credit points for the unit and 320 credit points for the course of study).

Unit credit points Example: 10 credit points	Total course credit points Example: 320 credit points
3 credit points	78 credit points

1.4 Student workload

Using the table below, indicate the expected student workload per week for this unit.

No. timetabled hours per week (1)	No. personal study hours per week (2)	Total workload hours per week (3)
3 hours	3 hours	6 hours

(1) Total time spent per week at lectures, tutorials, clinical and other placements, etc.

(2) Total time students are expected to spend per week in studying, completing assignments, etc.

(3) Sum of (1) and (2) equals workload hours.

For those students requiring additional English language support, how many additional hours per week is it expected that they will undertake?

Additional English language support: _____ hours per week

1.5 Delivery mode

Tick all applicable delivery modes for the unit and provide details in the following text box: If necessary or preferred, you may provide this information in a separate document, using the 'Attach evidence here' function of the online form.

- ☒ Face to face on site
- ☐ E-learning (online)
- ☐ Intensive/block mode (where the unit or a face to face component is delivered in a block)
- ☐ Mixed/blended
- ☐ Distance/independent learning (untimetabled)
- ☒ Full-time
- ☐ Part-time
- ☐ External
- ☐ Fast track
- ☐ Other (please specify)

1.6 Work-integrated learning activity

If the unit includes a work-integrated learning component (where completion of the unit requires students to undertake learning in a workplace outside of their higher education provider), provide details including the rationale, the specification and methods for assessing the learning outcomes, monitoring arrangements and whether the work integrated learning is required for professional accreditation. If necessary or preferred, you may provide this information in a separate document, using the 'Attach evidence here' function of the online form.

Also if available, upload copies or templates of the formal agreements with third parties for the work-integrated learning activity, using the 'Attach evidence here' function of the online form.

Refer to the TEQSA Guidance Note on Work-Integrated Learning as required (available on the TEQSA website).

1.7 Prerequisites and co-requisites

Are students required to have undertaken a prerequisite or co-requisite unit for this unit?

☒ Yes ☐ No

If YES, provide details of the prerequisite or co-requisite requirements below.

Introduction to Statistics and Probability

1.8 Other resource requirements

Do students require access to specialist facilities and/or equipment for this unit (for example, special computer access, physical education equipment)?

☒ Yes ☐ No

If YES, provide details of specialist facilities and/or equipment below.

Computer/Laptop with XLStat and/or SPSS

SECTION 2 – ACADEMIC DETAILS (CORE)

Learning outcomes for the unit
On successful completion of this unit students will be able to:
Classify and interpret statistical data using quantitative techniques [Knowledge of Data Science]
Apply quantitative and statistical analysis skills to problems [Problem Solving and Decision Making]
Evaluate and manage different types of data [Creativity and Innovation]
Not addressed [Teamwork]
Interpret a data set and present findings in oral and written form. [Intercultural Competence / Communication]
Assembling and communicating data in an ethical, transparent and socially responsible manner [Global Citizenship / Ethics]

Topics included in the unit
Week 01: THE ROLE OF STATISTICS AND THE DATA ANALYSIS PROCESS. Why Study Statistics. The Nature and Role of Variability. Statistics and the Data Analysis Process. Types of Data and Some Simple Graphical Displays.
Week 02: COLLECTING DATA SENSIBLY. Statistical Studies: Observation and Experimentation. Sampling. Simple Comparative Experiments. More on Experimental Design. More on Observational Studies: Designing Surveys (Optional). Interpreting and Communicating the Results of Statistical Analyses. GRAPHICAL METHODS FOR DESCRIBING DATA.
Week 03: NUMERICAL METHODS FOR DESCRIBING DATA. Describing the Center of a Data Set. Describing Variability in a Data Set. Summarizing a Data Set: Boxplots. Interpreting Center and Variability: Chebyshev's Rule, the Empirical Rule, and z Scores. Interpreting and Communicating the Results of Statistical Analyses
Week 04: SUMMARIZING BIVARIATE DATA. Correlation. Linear Regression: Fitting a Line to Bivariate Data. Assessing the Fit of a Line. Nonlinear Relationships and Transformations. Logistic Regression (Optional). Interpreting and Communicating the Results of Statistical Analyses
Week 05: THE PROBABILITY DISTRIBUTION FOR DISCRETE RANDOM VARIABLE. The Expected Value of Random Variable or a Function of Random Variable. The Binomial Probability Distribution. The Geometric Probability Distribution.
Week 06: Continue: The Probability Distribution for Discrete Random Variable. The Negative Binomial Probability Distribution (Optional). The Hyper Geometric Probability Distribution. Moments and Moment-Generating Functions. Probability-Generating Functions
Week 07: CONTINUOUS RANDOM VARIABLES AND THEIR PROBABILITY DISTRIBUTIONS. Introduction. The Probability Distribution for Continuous Random Variable, Uniform Probability Distribution, Normal Probability Distribution.
Week 08: SIMPLE LINEAR REGRESSION AND CORRELATION: INFERENCE METHODS. Simple Linear Regression Model. Inferences About the Slope of the Population Regression Line. Checking Model Adequacy. Inferences Based on the Estimated Regression Line

Topics included in the unit
<p>Week 09: MULTIPLE REGRESSION ANALYSIS.</p> <p>Multiple Regression Models. Fitting a Model and Assessing Its Utility. Inferences Based on an Estimated Model (online). Other Issues in Multiple Regression Interpreting and Communicating the Results of Statistical Analyses</p>
<p>Week 10: FURTHER REGRESSION TOPICS: Non-linear regression and Dummy Variables</p>
<p>Week 11: NONPARAMETRIC (DISTRIBUTION-FREE STATISTICAL METHODS:</p> <p>Distribution-Free Procedures for Inferences About a Difference Between Two Population or Treatment Means Using Independent Samples (Optional). Distribution-Free Procedures for Inferences About a Difference Between Two Population or Treatment Means Using Paired Samples. Distribution-Free ANOVA.</p>
<p>Week 12: DECISION THEORY AND BAYESIAN INFERENCE.</p> <p>Introduction. Decision Theory. The Subjectivist Point of View.</p>

Assessment tasks			
Type (1) (see examples noted below this table)	When assessed – year, session and week (for example, year 1, semester 1, week 1)	Weighting (% of total marks for unit)	Cross reference to learning outcomes
Individual Assignments	Sessions 1, 3, 5 and 9	20%	SLO A
Mid Semester Examination	Mid Semester Exam Week	30%	SLO C
Individual Project [(Emphasis on social responsibility and ethical data analysis)]	Sessions 2, 7 and 12	10%	SLO D
Final Examination [3 hours]	Exam Week	40%	SLO A,B

(1) Examples of types of assessment tasks include: assignments; examinations; group projects; online quizzes/tests; presentations; work-based projects; and reflective journals. Ensure that details of the types of assessment tasks are included such as specific topics, duration/length/word limit of assessment and any specific formats.

2.1 Prescribed and recommended reading

Provide below, in formal reference format, a list of the prescribed and recommended reading for the unit.

<p>Prescribed Text</p> <ul style="list-style-type: none"> Peck, R., Olsen, C., & Devore, J. L. (2015). Introduction to statistics and data analysis. Cengage Learning. <p>Recommended Reading</p> <ul style="list-style-type: none"> Piegorsch, W. W. (2015). Statistical Data Analytics: Foundations for Data Mining, Informatics, and Knowledge Discovery. John Wiley & Sons.
