



Course Outline (Higher Education)

School:	School of Engineering, Information Technology and Physical Sciences
Course Title:	REGRESSION AND MULTIVARIATE DATA ANALYSIS
Course ID:	STATS7101
Credit Points:	15.00
Prerequisite(s):	STATS5000
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	010103

Description of the Course :

This course introduces students to two widely used concepts in statistical data analysis: regression analysis and multivariate methods. It is designed as an applied course for individuals to solve real-world statistical problems in multiple disciplines, with emphasis on developing an understanding of the concepts and methodologies such as statistical forecasting, factor analysis and clustering of multi-dimensional data. We have chosen to feature the R programming environment for all analyses and visualisations in this course.

Grade Scheme: Graded (HD, D, C, etc.)

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes:**Knowledge:**

- K1.** This course introduces students to two widely used concepts in statistical data analysis: regression analysis and multivariate methods. It is designed as an applied course for individuals to solve real-world statistical problems in multiple disciplines, with emphasis on developing an understanding of the concepts and methodologies such as statistical forecasting, factor analysis and clustering of multi-dimensional data. We have chosen to feature the R programming environment for all analyses and visualisations in this course.
- K2.** Recognise the limitations of regression models and identify appropriate mitigation strategies.
- K3.** Recognise the role of multivariate methods for data decomposition strategies and clustering.
- K4.** Present clear, orderly and informative statistical summaries and technical reports.

Skills:

- S1.** Use R software to perform predictive analyses.
- S2.** Perform appropriate data assessment procedures to determine the most appropriate regression models.
- S3.** Screen the predictors and determine their suitability using appropriate techniques.
- S4.** Select the most appropriate model (from a pool of potential candidate models) using appropriate model validation approaches and error assessments.
- S5.** Perform decomposition techniques of multi-dimensional datasets.
- S6.** Communicate results from statistical analyses using appropriate statistical conventions.

Application of knowledge and skills:

- A1.** Build regression models for real life applications.
- A2.** Apply regression models to predict future events and conditions.
- A3.** Apply decomposition techniques and clustering to visualise patterns in data.

Course Content:

Topics may include:

- Review of basic statistical concepts
- The R environment for regression.
- Multiple linear and logistic regressions
- Time series forecasting
- MANOVA
- Linear discriminant analysis
- Principal component analysis
- Clustering

Values:

- V1.** Appreciate the role of statistics in forecasting applications.
- V2.** Appreciate the need for advanced statistical computer packages like R for data analysis and modelling.
- V3.** Appreciate the need to produce clear, orderly and informative statistical summaries and reports.
- V4.** Recognise the ethical requirements in presenting summarised data from statistical analysis.

Graduate Attributes

The Federation University FedUni graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		Development and acquisition of GAs in the course			
		Learning Outcomes (KSA)	Code A. Direct B. Indirect N/A Not addressed	Assessment task (AT#)	Code A. Certain B. Likely C. Possible N/A Not likely
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K3, S1-S6, A1-A3	A	AT1-AT4	A
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	N/A	N/A	N/A	N/A
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	N/A	N/A	N/A	N/A
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K4,S6	B	AT1, AT2, AT3	B, B, B
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	N/A	N/A	N/A	N/A

Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1-K4, S1-6, A1-A3	Weekly lab activities	Online quizzes	10-20%
K1-K4, S1-4, A1-A3	Regression and forecasting	Assignment	10-20%
K1-K4, S1-4, A1-A3	Multivariate analysis and its application to real-world problems.	Assignment	10-20%

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1-4, S4 and S6, A1 A2	Summative tasks covering fundamentals of different regression and multivariate analyses methods and their applications.	Test(s)	40% - 60%

Adopted Reference Style:

APA