MS3252: REGRESSION ANALYSIS

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Regression Analysis

Subject Code
MS - Department of Decision Analytics and Operations
Course Number
3252

Academic Unit
Department of Decision Analytics and Operations (DAOS)

College/School
College of Business (CB)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
CB2200 Business Statistics or equivalent

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
This course aims to:

- Introduce regression and analysis of variance techniques and models commonly used in solving business problems.
- Provide an opportunity for students to practice quantitative research skills with real business cases related to management decision making.
- Build students' competence in using contemporary computer software such as SAS, IBM’ s SPSS, R, Python to analyze business data.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain key concepts in regression analysis and analysis of variance, demonstrating an understanding of their applications in various business contexts.	40	x	x	
2	Evaluate different statistical theories and their relevance to real-world business problems, showcasing the ability to think critically about the appropriateness and limitations of various methods.	40		x	
3	Apply contemporary computer software such as SAS, SPSS, R, and Python to analyze data from real-life business scenarios, interpret the results accurately, and provide well-founded recommendations.	20		x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will participate in interactive lectures and discussions to understand key concepts in regression analysis and analysis of variance.	1	

2	Technique drilling	Students will complete individual and group assignments that require evaluating different statistical theories and their relevance to business problems. Students will apply statistical software to analyze real-life business data and also practice data analysis, interpret results, and make recommendations.	2, 3	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Exercises Regular exercises that require students to apply regression analysis concepts, use statistical software, and interpret data.	1, 2, 3	30	
2	Mid-Term Test A written exam assessing students' understanding of key concepts in regression analysis and analysis of variance, and their ability to evaluate statistical theories and methods.	1, 2, 3	30	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

Examination A written exam assessing students' understanding of key concepts in regression analysis and analysis of variance, and their ability to evaluate statistical theories and methods.

Assessment Rubrics (AR)

Assessment Task

Exercises

Criterion

Regular exercises that require students to apply regression analysis concepts, use statistical software, and interpret data.

Excellent (A+, A, A-)
Strong evidence of the capacity to analyze and synthesize; superior grasp of subject matter.

Good (B+, B, B-)
Evidence of grasp of subject; reasonable understanding of issues.

Fair (C+, C, C-)
Student who has some understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)
Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)
Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Assessment Task
Midterm Test

Criterion
A written exam assessing students' understanding of key concepts in regression analysis and analysis of variance, and their ability to evaluate statistical theories and methods.

Excellent (A+, A, A-)
Strong evidence of the capacity to analyze and synthesize; superior grasp of subject matter.

Good (B+, B, B-)
Evidence of grasp of subject; reasonable understanding of issues.

Fair (C+, C, C-)
Student who has some understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)
Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)
Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Assessment Task
Final Exam

Criterion
A written exam assessing students' understanding of key concepts in regression analysis and analysis of variance, and their ability to evaluate statistical theories and methods.

Excellent (A+, A, A-)
Strong evidence of the capacity to analyze and synthesize; superior grasp of subject matter.

Good (B+, B, B-)
Evidence of grasp of subject; reasonable understanding of issues.

Fair (C+, C, C-)
Student who has some understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)

Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Part III Other Information

Keyword Syllabus

Multiple Regression

Review of simple linear regression. Overview of the concept of linear models. Formulation and assumptions of multiple regression models. Inferences about regression parameters. Diagnostics of residuals. Comparing two regression models. Partial F-tests. Model building and variables selection strategies: all possible, forward, backward and stepwise regression. Multicollinearity. Using dummy variables and interacting terms. Transformations in regression analysis. Regression on dummy dependent variables.

Logistic Regression

Binary logit models. Maximum likelihood estimation. Odds ratio. Goodness of fit tests.

Analysis of Variance

One-way analysis of variance. Partition of the total sum of squares: ANOVA table.

Bayesian Linear Regression

Overview of frequentist and Bayesian approaches. Prior and posterior distributions. Formulation of Bayesian linear regression.

Reading List

Compulsory Readings

	Title
1	Mendenhall, W. and Sincich T. A Second Course in Statistics: Regression Analysis. Prentice Hall.

Additional Readings

	Title
1	Dielman, T.E. Applied Regression Analysis: A Second Course in Business and Economic Statistics, 4/e, Duxbury, 2005.
2	Kutner, M.H., Nachtsheim, C.J. and Neter J. Applied Linear Regression Models, 5/e, McGraw Hill, 2011.
3	Levine, D.M.,. Szabat K A, Stephan D F, Business Statistics: A First Course, 8/e, Prentice Hall, 2020.
4	Fox J, Weisberg S, An R Companion to Applied Regression. Sage Publication, 2011.
5	Ciaburro G, Regression Analysis with R, Packt Publishing, 2018.
6	Massaron L, Boschetti A, Regression Analysis with Python, Packt Publishing, 2016.
7	SAS Online Documents https://support.sas.com/en/documentation.html
8	Statistics Glossary https://www.statistics.com/glossaries/
9	Multiple Regression with Ren & Stimpy http://www.-psych.nmsu.edu/regression/home.html